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BRITISH COLUMBIA
MINISTRY OF FORESTS

# Lakes Timber Supply Area

## Rationale for Allowable Annual Cut (AAC) Determination

**Effective August 1, 2001**

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101-06926/



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## Objective of this document

This document provides an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination in July 2001, under Section 8 of the Forest Act, of the allowable annual cut (AAC) for the Lakes timber supply area (TSA). The document identifies where new or better information is needed for incorporation in future determinations. The document also identifies the urgent need for this current determination in view of the recent very rapid spread of the mountain pine beetle in the TSA, as well as an infestation of spruce bark beetle.

## Documentation and process

This document is briefer than most rationale statements for recent AAC determinations for TSAs and tree farm licences (TFLs) in British Columbia. In particular, this document gives a much abbreviated account of my considerations relative to that which was provided in the rationale for my recent determination for the Quesnel TSA. In that TSA, a significant increase in harvest level was contemplated and determined in respect of managing a beetle infestation. In many respects the Lakes TSA is now in a comparable situation, and in this AAC determination the rigour applied in the processes of acquiring and analyzing the relevant data and information, in compiling and reviewing the findings, and in considering and reasoning from all the resulting information, is unaltered from previous determinations. However, the *form* of the documentation of this and future determinations is abbreviated, by necessity, due to the number of AAC determinations required by statute to be made within a specified period. This abbreviation of the rationale takes place in a specific way, which is described in the following paragraphs, and which I am satisfied does not diminish the comprehensiveness or reliability of the review of the factor or of the decision itself. In fact, this approach merely alters the form of, rather than reduces, the overall documentation of the AAC determination process.

Each AAC determination for a TSA is preceded by the release, for public review and comment, of a data package and information report explaining the inputs and assumptions to be incorporated in a forthcoming timber supply analysis for the area. Inputs or assumptions are amended as appropriate in response to public comments received. Later the analysis report—a comprehensive review of the hypothetical volumes of timber available for harvest under current and specifically varied conditions, and including a socio-economic analysis—is released together with a public discussion paper, for review and comment. A summary of the public input received from this stage is subsequently published as an appendix to the AAC rationale statement explaining the reasons for the determination.

Rationale statements for AAC determinations to date have included explanations of the nature of current practice for each factor considered, and the way in which data or assumptions related to that practice were incorporated in the published analysis. This has been followed by a discussion of the extent to which I have found the representation of this aspect of practice in the analysis to be consistent with the practice itself, together with reasons why (a) adequate consistency was confirmed, or (b) an adjustment was needed and the timber supply projection was consequently revised or qualified in a

particular way. In those cases where consistency was confirmed, often the documentation in the rationale has served primarily or only to reinforce or consolidate information which already had been publicly documented in the data package and information report, the timber supply analysis report, the socio-economic analysis report, or the public discussion paper.

In this rationale for the Lakes TSA, and in future rationales, such reinforcements, which are essentially duplications of already published information, will not be presented. Rather, where by thorough review I have found that a particular aspect of current practice, as already explained in earlier documents, is consistent with the treatment in the analysis, I will simply present my finding that this consistency is confirmed for that particular factor. The rationale will then focus primarily on instances where I have found a difference between the published assumption or data used in the analysis, and the information previously made public about current practice in that regard. I will also generally address areas where particular uncertainties exist, or where particular assumptions or information have drawn significant public input or contention. In this way, the combination of documents published in the processes leading up to and including the determination will continue to provide a full description and accounting of the factors required by the *Forest Act* to be considered in AAC determinations. In the current case of the Lakes TSA, the factor with a primary influence on the determination—the abnormal infestation of bark beetles, and the nature and potential consequences of its proposed management—is documented in detail.

## Description of the Timber Supply Area

The Lakes TSA is located in central British Columbia and covers approximately 1.12 million hectares of the Lakes Forest District, one of six districts in the Prince Rupert Forest Region. The TSA is administered by the Lakes Forest District office in Burns Lake. The Lakes TSA occupies the easternmost portion of the Prince Rupert Forest Region, extending from Babine Lake in the north to the Entiako River in the south. The TSA lies along the western edge of B.C.'s interior plateau and is characterized by gently rolling uplands and a high concentration of lakes. Three major lake systems—Babine, Francois and Ootsa—intersect the TSA in an east-west direction, and almost 10 percent of the TSA is classified as lakes. The northeast portion of Tweedsmuir Provincial Park is adjacent to the southern part of the TSA.

Three biogeoclimatic zones are found in the Lakes TSA. The dominant zone in the TSA, and in the central interior of the province, is the Sub-Boreal Spruce (SBS) Zone. The SBS is found in valley bottoms up to elevations of about 1300 metres, with a climate characterized by moderate annual precipitation, severe, snowy winters and relatively short, warm, moist summers. Lodgepole pine, hybrid white spruce and subalpine fir are the dominant tree species. The Engelmann Spruce-Subalpine Fir (ESSF) zone is the uppermost forested zone in the Lakes TSA, typically occurring in pockets throughout the TSA, above the SBS zone. Steep topography, along with wet, cool summers and long, snowy winters, characterize this zone. Engelmann spruce and subalpine fir are the dominant climax tree species, while lodgepole pine is common after fires.

The Alpine Tundra (AT) zone occurs in very small areas above 1600 metres. The climate is cold, windy and snowy with a short, cool growing season. By definition this zone is treeless, although stunted trees are common at lower elevations of this zone. Vegetation is dominated by shrubs, herbs, mosses and lichens. Much of the alpine landscape lacks vegetation and is the domain of rock, ice and snow.

The forests of the Lakes TSA support a wide variety of wildlife species that are adapted to either surviving or avoiding the severe winters. These include moose, caribou, grizzly bear, mule deer, black bear and small fur-bearers. A number of special habitat management areas occur in the TSA, such as the caribou migration corridor from Chief Louis Lake to Tetachuck Lake; significant grizzly habitat areas in the Sutherland Valley and Klaytunkut Creek; and ungulate winter habitat for provincially important moose and the regionally and provincially significant Tweedsmuir-Entiako caribou herd.

Approximately 745 000 hectares, about 66 percent of the TSA land base, are considered Crown productive forest land. Currently about 79 percent of that productive forest is considered suitable and available for timber harvesting, representing about 52 percent of the total TSA land base. The TSA's forests are relatively homogeneous. Lodgepole pine stands, both pure and mixed with other species, dominate the TSA, representing about 76 percent of stands in the timber harvesting land base. A further 20 percent is covered by stands of predominantly spruce, and 4 percent by stands of predominantly balsam and fir.

The TSA is a sparsely populated area with many small rural communities. The major population centre is the Village of Burns Lake, where about one-third of the TSA's population of 6,900 (1996 census) reside. Other communities include Decker Lake, Tintegal, Francois Lake, Southbank, Grassy Plains, Danskin, Takysie Lake and Ootsa Lake.

The forests of the TSA provide for a wide range of resources, including forest products, fish and wildlife habitat, and recreation and tourism amenities. Recreational use of the forests is moderately high due to the proximity of Tweedsmuir Provincial Park and the high concentration of lakes in the TSA. Recreational activities are primarily fishing, boating and hunting. The visual quality of the TSA's landscapes is important to recreation and tourism.

Six First Nations have reserve lands and communities in the TSA, with a total population of about 2,500 persons. These First Nations are the Cheslatta Carrier Nation, Burns Lake Band, Nee Tahi Buhn Band, Skin Tyee Band, Wet'suwet'en First Nation and Lake Babine Nation. These local First Nations and seven others, the Nadleh Whut'en Band, Office of the Wet'suwet'en, Stellat'en First Nation, Tl'azt'en Nation, Ulkatcho Band, Yekooche First Nation, and the Carrier-Sekani Tribal Council, claim traditional territories that overlap within the TSA. Several First Nations, both local and non-local, are negotiating comprehensive land claims within the TSA. Once the treaty processes are complete, the treaties will be considered in future timber supply reviews.

## Critical issue: bark beetle infestation

The Lakes TSA forms part of a vast area in central British Columbia that is currently infested by bark beetles. The seriousness of this infestation is a primary consideration in this determination, and I have documented my considerations regarding management objectives for the control and salvage of the damage done by beetles primarily under section 8(8)(e) of the *Forest Act: Abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area*, and section 8(8)(b), *the short and long term implications to British Columbia of alternative rates of harvesting from the area.*

In overview, timber in the Lakes TSA is under extensive attack by two beetle species, the mountain pine beetle (MPB) and the spruce bark beetle. The MPB is in epidemic status in parts of the TSA, spreading rapidly from the southwest. The volume of pine infested in 2000/2001 has been estimated at 1.9 million cubic metres, and predictive modelling and overview flights from June 2001 suggest that the current MPB populations are increasing by over 200 percent. The BRITISH COLUMBIA Forest Service and consultants estimate that at current rates of spread, by 2005, the volume of newly attacked ('green-attack') timber in the TSA will be 19 million cubic metres with an additional 35 million cubic metres of 'green-attack' by 2010. At this rate of spread, in 10 years' time 75 percent of the mature pine in the TSA will be infested at some level. Spruce bark beetle activity is also currently increasing in the TSA; the infestation level for 2000 was estimated at 550 000 cubic metres and is expected to reach 700 000 cubic metres in 2001, but will likely decline to about 50 000 cubic metres in 2005. The entire current AAC of the TSA is directed toward removing 'green-attack' trees, to help reduce the spread of the beetles.

With the objective of minimizing the rate of spread of the beetles in the TSA, and thus also the overall extent of the damaged and potentially unsalvageable timber, as well as to salvage already killed timber before its value is lost, the Lakes Forest District Manager has requested consideration of an increase of 1.5 million cubic metres in the allowable harvest level. The implications, for forest values including wildlife habitat and timber supply, of applying and of not applying such an increase, are discussed in the above noted sections and in 'Reasons for decision'.

## History of the AAC

Following a 1981 TSA report, in 1982 the AAC for the Lakes TSA was determined at 1.5 million cubic metres. After a timber supply analysis in 1985, the 1.5-million-cubic-metre AAC was confirmed in a 1987 TSA Plan. In 1996 the AAC for the TSA was again determined at the current level of 1.5 million cubic metres.

The AAC is currently apportioned as follows:

| Form of Agreement | Total cubic metres | Percentage of AAC |
|---|---|---|
| Forest Licence, replaceable | 1 008 850 | 67.2 |
| Forest Licence, non-replaceable | 0 | 0 |
| Timber Sale Licences Replaceable (<=10 000 $m^3$) | 1795 | 0.1 |
| Community Forest Agreement | 23 677 | 1.6 |
| Woodlot Licences * | 52 600 | 3.5 |
| Small Business Forest Enterprise Program, (SBFEP) Any Category (Section 20) | 52 000 | 3.5 |
| SBFEP, Category 1 (Section 20) | 167 692 | 11.2 |
| SBFEP, Category 2 (Section 20) | 35 586 | 2.4 |
| SBFEP Bid proposals, (Section 21) | 157 800 | 10.5 |
| Forest Service Reserve | 0 | 0 |
| Total AAC | 1 500 000 | 100.0 |

* AACs for woodlot licences are determined and administered separately from the AAC for the TSA, as required by the *Forest Act*. Therefore, the area and AAC volumes of woodlot licences must be removed from consideration when determining the AAC for the TSA. The volume apportioned here for woodlot licences is 52 600 cubic metres, of which 38 000 cubic metres have been allocated in licences that have been issued since the last AAC determination; this volume is excluded from the new AAC determined for the TSA.

## New AAC determination

Effective August 1, 2001, the new AAC for the Lakes TSA will be 2 962 000 cubic metres. This AAC volume excludes all volumes in issued woodlot licences. This new AAC will remain in effect until another new AAC is determined, which must take place within five years of the present determination.

The following observation forms an integral part of this determination. Staff of the BCFS will monitor and apprise the chief forester of the condition of the MPB infestation, on the understanding that, if and when required, this determination may be revisited at a date earlier than required by statute.

## Information sources used in the AAC determination

- *Lakes Timber Supply Area: Rationale for AAC Determination*, British Columbia Ministry of Forests, Victoria, British Columbia, 46pp., September 1996;
- *Lakes Timber Supply Area Timber Supply Review Data Package and Information Report,* March 1999;
- *Lakes Timber Supply Area Analysis Report and Information for Urgent AAC Increase,* March 2001;
- Lakes Land & Resource Management Plan (LRMP) January 2000;
- Interim regional Rust report January 1999;
- Statement of District Manager Policy concerning LRMP implementation, January 10, 2001;
- Timberline Forest Inventory Consultants EFMPP Decision Support Analysis Woodstock / Stanley Results draft report June 1999
- Timberline Forest Inventory Consultants, September 13, 1999, Lakes TSA Licensee Group Lakes, Lakes TSA LRMP Timber Supply Analysis;
- Government of British Columbia, Higher Level Plan Order July 26th 2000
- Silvicon report on MPB April 2001;
- Forest Inventory Planning file, British Columbia Forest Service (BCFS);
- Lakes TSA licensee Forest Development Plans;
- Major Licence Silviculture Information System records; BCFS;
- *Lakes TSA Inventory Audit*, BCFS Resource Inventory Branch, January 1999;
- *Forest Practices Code Managing Identified Wildlife Guidebook*, 1999, Ministry of Environment, Lands and Parks (MELP) and BCFS;
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province;
- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources;
- Letter from the Deputy Ministers of Forests and Environment, Lands and Parks, dated August 25, 1997, conveying government's objectives regarding the achievement of acceptable impacts on timber supply from biodiversity management;
- *Forest Practices Code Timber Supply Analysis*, BCFS and MELP, February 1996;
- *Forest Practices Code of British Columbia* Guidebooks, BCFS and MELP;
- *Higher Level Plans: Policy and Procedures,* BCFS and MELP, December 1996;
- *Forest Practices Code of British Columbia Act*, July 1995;
- *Forest Practices Code of British Columbia Act: Regulations and Amendments*, April 1995;
- British Columbia Ministry of Forests, Lakes Timber Supply Review Summary of Public Input April 2001

- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the BCFS and MELP at the AAC determination meeting held in Burns Lake, BC, May 2 & 3, 2001;
- Ecological Role of Beetle-killed Trees: A review of salvage impacts. John Stadt, Forest Ecosystem Specialist, Ministry of Water, Land and Air Protection, July 9, 2001.

## Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for the Lakes TSA, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

## Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for timber supply areas and tree farm licences. Section 8 is reproduced in full as Appendix 1.

## Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. In making a large number of determinations for many forest management units over extended periods of time, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainty. To make my approach in these matters explicit, I have set out the following

body of guiding principles. If in some specific circumstance it may be necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to *increase* the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to *reduce* the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the Forest Practices Code.

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although implementation of the Forest Practices Code has been underway since the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination I take this uncertainty into account to the extent possible in context of the best available information.

As British Columbia progresses toward the completion of strategic land use plans, the eventual timber supply impacts associated with land-use decisions resulting from the various planning processes, including the Land and Resource Management Planning (LRMP) process, are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate to speculate on the timber supply impacts that will eventually result from land-use decisions not yet taken by government. Thus I do not account for possible impacts of existing or anticipated recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions. However, where specific protected areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base and are no longer considered to contribute to the timber supply in AAC determinations.

The Lakes TSA lies within the area covered by the Lakes Land and Resources Management Plan which was approved by government in April 2000. Forest development in the TSA is required to be consistent with aspects of the plan that incorporate direction by the Higher Level Plan approved in July 2000, as provided under the Forest Practices Code. In a letter to licensees, the District Manager confirmed the requirement to follow the objectives of the LRMP.

Forest Renewal British Columbia (FRBC) has funded a number of intensive silviculture activities in the province that have the potential to affect timber supply, particularly in the long term. As with all components of my determinations, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, where appropriate, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs between 1992 and 1996. In any case, the data and models available today are superior to those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from decisions in recent years in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting the Crown's obligations under

these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Lakes TSA. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

Overall, in making AAC determinations, I am mindful of my obligation as steward of the forest land of British Columbia, of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of my responsibilities under the *Forest Practices Code of British Columbia Act*.

## The role of the base case timber supply analysis

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TSA a timber supply analysis is carried out by British Columbia Forest Service (BCFS) staff using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model (FSSIM—'Forest Service Simulator'; in this case for the Lakes TSA, 'version 3.0'), a series of timber supply forecasts is produced, reflecting different decline rates, starting harvest levels, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. Often termed the 'base case', this serves as a reference forecast, and forms the basis for comparison when assessing the implications of uncertainty for timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case reference forecast for a TSA is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

Therefore, much of what follows in the considerations listed or discussed below follows an examination of the degree to which all the assumptions made in generating the base case reference forecast are realistic and current, and the degree to which the resulting predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current, available information about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Forest Practices Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case or any other specified alternative forecast. Judgements that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, additional precision or validation may not be gained in all cases by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

**Base case forecast for the Lakes TSA**

The data package for the Lakes Timber Supply Area (TSA), on which the timber supply analysis was based, and which includes detailed descriptions of the management practices and the assumptions used to incorporate them into the analysis, was released with a summary information report for public review in March 1999. The *Lakes Timber Supply Area Analysis Report and Information for Urgent Allowable Annual Cut Increase*, including a social-economic analysis, was published in March 2001, for a 30-day period for public review and comment, together with the *Lakes Timber Supply Area Public Discussion Paper—Urgent Review of the Allowable Annual Cut*. Appendix A of the March 2001 analysis report includes a description of the data inputs and assumptions used in the timber supply analysis, including the most recently available assessments of current forest management, the land available for timber harvesting, and timber yields.

Because forest management is inherently a long-term undertaking, uncertainty is present in much of the information used in analysing the timber supply. Any base case thus provides only a part of the timber supply picture for a TSA, and should not be viewed in isolation from accompanying sensitivity analysis. In my determination I have considered a number of relevant sensitivity analyses in assessing particular uncertainties, as well as alternative harvest forecasts, as documented in this rationale statement.

For the Lakes TSA, for reference purposes, a base case harvest forecast was selected to represent the potential timber supply under the normal current management regime, that is, without incorporating the implications of the current MPB epidemic. (In the base case, unsalvaged losses were estimated at a constant 31 976 cubic metres per year.) The implications of the MPB infestation are considered under 'Abnormal infestations and major salvage programs'—'Infestation of bark beetles'—(*Forest Act* s. 8(8)(e)), and under 'the short and long term implications to British Columbia of alternative rates of timber harvesting from the area' (*Forest Act, s.* 8(8)(b)).

The current AAC for the Lakes TSA is 1.5 million cubic metres, but since the last AAC determination, 38 000 cubic metres have been allocated to woodlot licences which are administered separately under the *Forest Act*. The starting harvest level in the base case projection was therefore appropriately set at 1 500 000 minus 38 000 = 1 462 000 cubic metres. The base case accounted for the Community Forest Pilot Agreement and the management requirements of the Lakes LRMP.

In the base case forecast, the current allowable harvest level of 1 462 000 cubic metres (net of issued woodlots) was maintained until decade 12, followed by an increase of approximately 16 percent to a steady long-term level of 1 695 000 cubic metres. This forecast differs from the 1995 base case mainly due to accounting for: new practices and protected areas under the Lakes LRMP; a land base reduction resulting from the Community Forest Pilot Agreement; an assumption of significantly lower minimum harvestable ages; and a change in estimated growth rates for regenerated pine stands. These last two factors combined to eliminate the previous forecast's mid-term decline.

In addition to the base case forecast, a reference forecast was produced in which the starting level was set at the long-term level, showing the maximum achievable 'non-declining' harvest flow. This projection showed greater sensitivity to changes in input data, relative to the base case, and for this reason was used as a basis for all sensitivity analyses.

For the purpose of determining this AAC for the Lakes TSA I have relied in part on this base case projection of the timber supply, and also on several related forecasts, in accordance with my assessments of the validity of the assumptions incorporated in the projections, as discussed in following sections of this document. In particular, as discussed in 'Alternative harvest flows', and 'Infestation of bark beetles', I have relied on projections representing the 'worst-case', 'moderate-case' and 'best-case' scenarios, as well as an analysis incorporating a combination of changed assumptions, and on sensitivity analyses applied to the maximum non-declining flow projection.

## Consideration of factors as required by section 8 of the *Forest Act*

**Section 8 (8)**

**In determining an allowable annual cut under this section the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider**

### (a) the rate of timber production that may be sustained on the area, taking into account

#### (i) the composition of the forest and its expected rate of growth on the area

Under this subsection of the Act, as discussed in my 'Reasons for decision', I have reviewed, assessed for reliability, and considered with respect to consistency with current legislation, policy, approved land use plans, and forest practices, information describing the nature and/or the extent, in the Lakes TSA, of the following factors:

- environmentally sensitive areas;
- physical and economic operability;
- sites with low timber growing potential;
- land base exclusions for stands with marginal merchantability (problem forest types);
- land base exclusions for roads, trails and landings;
- woodlots and community forests;
- protected areas;
- land conversion to agriculture;
- existing forest inventory;
- the species and age profiles of the forest;
- volume estimates for existing stands;
- volume and site productivity estimates for regenerated stands;
- operational adjustment factors for regenerated stands;
- minimum harvestable ages; and
- use of improved seed.

I have concluded that the timber supply projections based on the assumptions as described in the analysis adequately represent each of these factors, with the following exceptions which are discussed in 'Reasons for Decision': Problem forest types; land conversion to agriculture; existing forest inventory; volume and site productivity estimates for regenerated stands; and the use of improved seed.

**(ii) the expected time that it will take the forest to become re-established on the area following denudation**

Under this subsection of the Act, as discussed in my 'Reasons for decision', I have reviewed, assessed for reliability, and considered with respect to consistency with current legislation, policy, approved land use plans, and forest practices, information describing the nature and/or the extent in the Lakes TSA of factors including:

- regeneration delay;
- impediments to prompt regeneration; and
- not satisfactorily stocked (NSR) areas.

I have concluded that the timber supply projections based on the assumptions as described in the analysis adequately represent each of these factors, with the following exception which is discussed in 'Reasons for Decision': Not satisfactorily restocked (NSR) areas—with respect both to the assumed rate of regeneration, and the inclusion of non-commercial cover.

**(iii) silvicultural treatments to be applied to the area**

Under this subsection of the Act, as discussed in my 'Reasons for decision', I have reviewed, assessed for reliability, and considered with respect to consistency with current

legislation, policy, approved land use plans, and forest practices, information describing the nature and/or the extent in the Lakes TSA of factors including:

- silviculture systems; and
- incremental silviculture and commercial thinning.

I have concluded that the timber supply projections based on the assumptions as described in the analysis adequately represent each of these factors.

**(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area:**

Under this subsection of the Act, as discussed in my 'Reasons for decision', I have reviewed, assessed for reliability, and considered with respect to consistency with current legislation, policy, approved land use plans, and forest practices, information describing the nature and/or the extent in the Lakes TSA of factors including:

- utilization and compliance; and
- decay, waste and breakage.

I have concluded that the timber supply projections based on the assumptions as described in the analysis adequately represent each of these factors.

**(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production:**

Under this subsection of the Act, as discussed in my 'Reasons for decision', I have reviewed, assessed for reliability, and considered with respect to consistency with current legislation, policy, approved land use plans, and forest practices, information describing the nature and/or the extent in the Lakes TSA of factors including:

- integrated resource management objectives;
- management zones and forest values other than timber; and
- forest cover requirements for:
  - green-up and cutblock adjacency;
  - visually sensitive areas and visual quality objectives;
  - backcountry lakes and recreation areas;
  - the Entiako caribou winter habitat and migration corridor;
  - high value moose and deer winter habitat;
  - grizzly bear habitat;
  - riparian reserve and management zones;
  - identified (at-risk) and other wildlife;
  - stand-level biodiversity; and
  - landscape-level biodiversity.

I have concluded that the timber supply projections based on the assumptions as described in the analysis adequately represent each of these factors with the following exceptions which are discussed in 'Reasons for Decision': Green-up period; stand-level biodiversity (wildlife tree patches); identified wildlife management; visual quality objectives; and landscape-level biodiversity (aging of the forest outside the timber harvesting land base). Implications of alternative harvest rates for wildlife habitat in general and the caribou migration corridor in particular are discussed under 'Alternative harvest flows'.

**(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber;**

I have reviewed the implications of analyzing forest cover and other requirements using spatially explicit rather than spatially implicit modelling. As discussed in 'Reasons for Decision', I have concluded that the use of spatially explicit timber supply modelling may affect the projected timber supply.

I have reviewed management requirements for First Nations cultural and heritage resources and have concluded that, largely due to overlaps with land base exclusions from the timber harvesting land base for riparian management and other objectives, these requirements were adequately accounted for in the analysis.

I have reviewed the monitoring of harvesting activities in lower volume classes, and have concluded that while the information provided by this monitoring is helpful in providing an indication of performance under normal conditions, any concerns in this regard are currently overtaken by the need to manage the beetle infestation which focuses preferentially on larger diameter trees. The appropriate time to account for any implications for timber supply arising from harvest profile information will be when the current infestation has collapsed and operations have returned to normal levels.

## (b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area;

**- alternative harvest flows**

I have reviewed a number of alternative harvest flow projections for the Lakes TSA, as follows:

1. *Base case:* As noted earlier in 'Base case forecast for the Lakes TSA', a base case harvest forecast was selected to represent the potential timber supply under the normal current management regime, accounting for management requirements of the Lakes LRMP and the Community Forest Pilot Agreement, but not accounting for implications of the current MPB epidemic. In this projection, the starting harvest level of 1 462 000 cubic metres per year was maintained until decade 12, followed by an increase of approximately 16 percent to a steady long-term level of 1 695 000 cubic metres per year.

2. *Maximum non-declining-even-flow*: A forecast was produced using base-case data with the starting level set at the base-case long-term level of 1 695 000 cubic metres per year and projecting the maximum achievable non-declining harvest flow. This projection showed more sensitivity to input changes than the base case, and therefore was used as a basis for all sensitivity analyses.

3. *Maximized first decade, with 10-percent declines and subsequent even flow*: This projection showed the maximum level achievable in the first ten years with only 10-percent declines (after 10 and 20 years) without falling below the same long-term harvest level of 1 695 000 cubic metres per year. The highest initial level achievable under these conditions while meeting all other base case criteria was 2 093 000 cubic metres per year. This projection showed there is considerable flexibility in the harvest level during the first decade, due to the large stock of old timber available for harvesting, and to higher indices of site productivity and lower minimum harvestable ages than were assumed in the 1995 analysis.

A number of reference forecasts were produced specifically to examine the implications of alternative scenarios for, and increased harvest levels to manage, the MPB. These are described here and discussed further below, under 'Infestation of bark beetles'.

4. *'Worst-case' with controlled step-down*: A 'worst-case' projection was produced, based on continuation for 10 years of the currently accelerating rate of spread of the MPB (i.e. a yearly doubling of the infested area), and assuming a 10-year regeneration delay for attacked, unsalvaged pine stands, followed by reduced growth rates as reflected by the use of natural, rather than managed-stand yield curves. In this projection, the harvest level was set at 3 million cubic metres per year for ten years, followed by two declines of 35 percent per decade over two decades, to a level of 1 270 000 cubic metres, which is below the current harvest level of 1 462 000 cubic metres. In decade 9 the level rose to 1 400 000 cubic metres, and a steady long-tem level of 1 680 000 (slightly lower than in the base case) was reached in decade 14.

5. *'Worst-case' without controlled step-down*: In a similar 'worst-case' projection the harvest level was again set at 3 million cubic metres per year for ten years, but was then reduced directly to 1 380 000 cubic metres. This was again below, but now closer to, the current harvest level. In decade 9 the projection again rose, this time to 1 425 000 cubic metres, a slightly higher level than with the step-down. The same steady long-tem level as with the step-down, 1 680 000 cubic metres, was reached in decade 14.

6. *'Moderate-case' scenario*: In this projection the level of MPB attack in the second 5 years was assumed to be the same as in the first five years (i.e. a constant, instead of an accelerating rate of spread by the insect was assumed). The initial harvest level of 3 million cubic metres was held for ten years. The forecast then declined at 20 percent per decade, reaching a mid-term level of 1 410 000 cubic metres in decade five. In decade 9 the harvest level rose to 1 450 000 cubic metres, and rose again in decade 14 to the same long-term level of 1 680 000 as in the worst-case scenario.

7. *'Best-case' scenario*: In a best-case projection, it was assumed that a severe winter in 2001-2002 would stop the MPB infestation outright. This projection showed a harvest level of 2 320 000 cubic metres per year for five years, declining to 2 204 000 cubic metres per year for the second five years, then declining at 10 percent per decade to reach the base-case long-term level of 1 695 000 cubic metres per year.

Two projections were created to examine the harvest flow consequences of *not* increasing the initial harvest level to control the spread of beetles and salvage attacked timber:

1. *'Do-nothing' alternative 1:* In this projection, the analyst attempted to maintain the initial harvest level of 1.695 million cubic metres in the maximum non-declining flow base case alternative, in conjunction with the currently accelerating rate of spread of the 'worst-case' scenario in projection 4. In this case the harvest level had to decline, beginning in decade two, at a maximum rate of 15 percent per decade. A mid-term harvest level of 1 225 000 cubic metres per year was reached in decade 3, almost 4 percent below that of the 'worst case scenario with step-down' or 9 percent below that in the 'worst-case without step-down'. The 'do-nothing' projection then continued at this level for 6 decades before coinciding with the 'worst case' projections.

2. *'Do-nothing' alternative 2:* In this projection the analyst attempted to maintain the current base case level of 1.462 million cubic metres in conjunction with the same rate of spread used in projections 4 and 8. In this case, beginning in decade 2 the harvest level declined at 10 percent per decade to reach a mid-term level of 1 265 000 cubic metres per year in decade 3. This mid-term level was maintained for 8 decades before the same long-term level as in the 'worst case' was reached in decade 14.

3. *Combination forecast:* At my request, an additional analysis was performed to incorporate changes to several input parameters identified in my considerations as requiring adjustment, as explained below in 'Reasons for decision'. These changes accounted for: the inclusion of previously excluded agricultural land; corrections regarding NSR land and non-commercial cover; a correction to the green-up period; corrections to the assumptions about wildlife tree patches; an adjustment to assumptions about the aging of forest cover outside the timber harvesting land base; a correction for the age of the data in the inventory file; a correction to disturbance limits for VQOs; and an increase in the duration of merchantability of timber after beetle-attack. The projection also included a minor adjustment to deductions for roads, trails and landings.

In this projection the initial harvest rate of 3 million cubic metres per year was maintained for ten years, with a subsequent 'step-down' to 1 975 000 as in projection 4, to a mid term level of 1.5 million cubic metres per year (essentially the current AAC and higher than the 'worst-case' mid-term level of 1 425 000 cubic metres per year) after two decades. This level was held until an increase in decade 13 to a long-term level of 1 660 000 cubic metres per year, slightly less than in the 'worst case' (due primarily to corrected wildlife tree patch requirements and to accounting for aging outside the timber harvesting land base).

From these various forecasts, a number of informative deductions may be made. Projections 1, 2 and 3 show that without the currently accelerating beetle infestation, there would be considerable flexibility in the timber supply to accommodate a range of management choices while continuing to meet all environmental requirements and without compromising future supplies.

However, with the current beetle infestation, forecasts 1 to 3 become unrealistic as the beetle is now killing timber that would otherwise continue to age and grow and be harvestable in future years. The remainder of the projections account for these losses to beetle damage in various ways as follows.

Projection 4, the 'worst-case' forecast with the controlled step-down, shows that if the infestation continues to spread for 10 years at the current rate, this will result in a projected unsalvaged volume of 25.4 million cubic metres of attacked and dead or dying timber remaining on the landscape after ten years. Under projection 6, the 'moderate case' forecast, this unsalvaged volume after 10 years would be less, at 8.4 million cubic metres, and, under projection 7, the 'best case', just 0.05 million cubic metres, which is the normal level of unsalvaged loss attributable to endemic MPB levels. In the 'do-nothing' cases, the unsalvaged volume at the end of ten years would be about 13.2 million cubic metres additional to the 25.4 million cubic metres in the worst case, or about 38.6 million cubic metres total. This would be the foregone volume if no increase were applied to the current harvest level, assuming the same rate of spread of the beetles. In fact, without the increased harvest rate, it may be assumed that the associated lower level of control would permit the rate of spread of the beetles to be higher, resulting in even more dead trees on the landscape.

These unsalvaged volume figures result in part from assuming that none of the timber killed in any of the first five years would remain available for harvest during any of the second five years. As discussed in 'Reasons for decision', I consider this assumption to overestimate the unsalvaged volumes to some extent. While the figure of 13.2 million cubic metres may therefore be overstated on this account, as noted above it may also be an underestimation, given the higher rates of spread associated with lower harvest levels. In any case, a very large volume differential will remain between the unsalvaged losses in the 'worst-' and 'do-nothing' cases, and under the pressing circumstances I have continued to refer to this figure as a reasonable indication of the order of magnitude of the potential additional volume lost if no increase occurs in the harvest rate.

From these analyses, which are discussed further below in 'Infestation of bark beetles', it is clear that very large volumes of timber are currently at risk to the MPB in the Lakes TSA. From aerial observation it is clear that very large areas of pine forests are at risk across the landscape. Only a large increase in harvest level can help to reduce the rate of devastation and to salvage part of the inevitably associated financial loss. The large increase in harvest rate now contemplated in response to the growing infestation will entail considerable and complex, social, economic and environmental implications, as discussed next.

**- social and economic implications:**

The increased harvest levels typically employed as a management response to epidemic MPB infestations imply increased levels of employment and economic activity, including higher revenues to government—but only up to a point. Indications are that, in current market conditions, if an excessive supply of logs is generated, this could work to depress timber prices. Administrative requirements, the capabilities of infrastructures for hauling and transportation, and the capacities of existing processing plant, all place potential limitations on the attainability of large increases in harvest levels.

In assessing these factors I have taken guidance from the Economics and Trade Branch of the Ministry of Forests and from local knowledge provided by the Lakes Forest District Manager and the Regional Manager of the Prince Rupert Forest Region. I have also considered public input to the AAC determination process. Senior BCFS region and district staff advise that the largest annual harvest volume that could be accommodated by the existing infrastructures is approximately 3 million cubic metres, and that the administration of this cut would in any case necessitate additional human and financial resources—particularly given the planning complexities and various management strategies needed to be applied to the various locations under varying degrees of environmental sensitivity and intensities of infestation.

With respect to the potential impacts of such an increased harvest volume on the local economy, assuming that appropriate markets can be found for additional products, increased economic activity is to be expected for the duration of the increased harvest, followed by either a gradual or a sudden return to 'normal' levels, beginning when the infestation collapses, and depending on the extent of the damaged infestation at that time, on the total amount of damaged timber, and on decisions on how much standing dead wood to retain for habitat or ecological purposes, discussed below. A concern was expressed in public input by a small business operator, that log-market prices are likely to fall regionally in response to a large increase in the availability of timber in this area. Senior BCFS branch, region and district staff agree this could be a legitimate concern, particularly for some smaller-scale operators who could experience financial hardship from reduced prices. It is not my intent to be dismissive of this concern and I am aware that field staff are seriously considering ways to minimize the potential impacts on small operators. I strongly support and encourage this work. While there are many unfortunate outcomes of this full-blown epidemic, strong efforts must be made to respond to it in as balanced a manner as possible.

Employment and revenue implications of the proposed increase in harvest level are discussed below in 'Community dependence on the forest industry'.

**- environmental implications:**

The epidemic MPB population, by killing very large numbers of mature pine trees, will inevitably affect the structure of the TSA's forests and consequently the supply of various kinds of natural habitats. This will happen whether harvest levels are increased or not. A large increase in harvest level, employed as a management response to the MPB, will further or differently affect the supply of habitats in a variety of ways that have not yet been fully studied and therefore cannot be predicted with confidence, and

which will also depend on the mix of silvicultural systems used. To examine some of the related implications I requested the Forest Ecosystem Specialist, now of Habitat Protection Section, Skeena Region, Ministry of Water, Land and Air Protection, to undertake a literature search in respect of an overview of the roles played by forest stands that are killed by beetles in contributing to ecological functions and processes in forested landscapes, particularly with respect to the provision of wildlife habitats. I have taken into consideration the findings and recommendations of this work—which I appreciate was undertaken during a brief period and on short notice—and have reasoned from them as follows.

Under unmanaged conditions, before extensive fire suppression and timber harvesting, BC's central interior forests naturally underwent large-scale stand-replacing events brought on by wildfire and insect outbreaks. Consequently, landscapes there have been dominated alternately by old and young forests with varied species and structure. Today, the Lakes TSA supports a large proportion of older forest. Under normal management conditions, in consistency with the Lakes LRMP, parts of the complex habitats in this older forest are being converted by planned clearcut harvesting into young seral and open habitats. Other parts are being managed to retain higher percentages of forest cover in order to provide an ongoing supply of older-forest habitat, for instance in the Caribou Migration Corridor.

The presence of an epidemic population of MPB in the TSA and the abundance of susceptible mature lodgepole pine mean that the rate of conversion of older habitats will now inevitably be increased to some degree, whether by insect attack followed by eventual blowdown, or by harvesting to control the rate of spread or to salvage the attacked timber. If an accelerated harvest rate in the TSA were implemented entirely by clearcutting, which is not currently proposed, or if it were proposed that all infested stands be harvested, which is not the case, this would further increase the rate of conversion of older-forest habitat, reducing populations of species dependent on such habitats and favouring those species that utilize more open, younger seral forest habitats. It must recognized that those older habitats are being fundamentally altered from their current state by the beetles. It has been estimated that implementing the proposed higher harvest rate for 10 years would result in the conversion of approximately 60 000 hectares to younger and more open forms of habitat, that is, about one-tenth of the 590 000-hectare timber harvesting land base. However, recent trends indicate that even with the additional harvest, many live and dead stands unaltered by harvesting will remain on the landscape, and very many more will also remain in parks.

To date, the advancing front of the MPB population, where I understand the district manager intends to concentrate the majority of any additional harvesting efforts, has been composed primarily of small infestation centres of from zero to five hectares. The application of alternative silvicultural systems, such as partial cuts and small openings, to these infestations, could remove the infestations while preserving some of the current diversity of habitats. It is noted, however, that some associated blowdown and consequent loss of habitat would also likely occur, and increased road access could further reduce the value of some habitats, at least temporarily until deactivation. Deactivation measures have been applied in high value caribou habitat areas as a habitat protection measure, after beetle salvage operations have been concluded in a given area.

In areas such as the Caribou Migration Corridor, it may be better to leave some or all standing dead beetle-attacked timber as well as any remaining living understory of other species (such as spruce and fir), since salvage operations may cause an increased susceptibility of the remaining live cover to blowdown, even using patch-cutting or modified selection systems. I am advised, however, that while residual live retention would likely be greater in unsalvaged and unmanaged stands, some degree of blowdown is also likely to occur in any case at some point following beetle attack, even without salvage harvesting, and that the resulting tangle of coarse woody debris could eventually present obstacles that could to some extent reduce the value of such stands for ungulate habitat. On the other hand, salvage that would reduce this downed coarse woody debris could also reduce the creation of denning habitat for some small prey species that help to support other, larger species. Overall, the impacts of bark beetles on the ecology of forest stands are clearly related to the degree of mortality incurred, which depends on the intensity of the infestation and on the proportion of susceptible trees in each stand. Likewise, the impacts of increased harvesting depend on the evolving nature and extent of the infestation and on the applied silvicultural systems.

In short, both the epidemic presence of the beetle, and an increased harvest rate either for insect control or for salvage, imply complex and incompletely predictable consequences for the otherwise planned successional development of the forest and associated habitats in the Lakes TSA.

Operationally, a large number of unsalvaged, dead snags could present unsafe working conditions for any eventual future salvage, and could contribute to very long regeneration delays for pine that will not regenerate well in shade conditions.

Whatever the chosen or preferred environmental outcome for specific areas, current projections of unsalvaged volumes of timber represent significant economic losses, both in the short term and, due to delayed and unplanned regeneration, also in the mid-to-long term.

In these complicated circumstances, I consider two measures to be prudent. First, I recommend the collection of empirical data on wildlife use, from sites that are salvage-harvested and from similar sites left unharvested, with guidance from BCFS regional research staff as appropriate. This will provide local information to guide operations and will also help to reduce uncertainty in the event of similar, future situations in the TSA and potentially in other areas, given the widespread, regional nature of the current infestation. Secondly, with the above and other appropriate measures in place for the study and protection of biodiversity, and with local consultation—which I understand is already underway—between BCFS staff and other agencies and stakeholders as to the suitability of various treatment options in various locations, I believe it is appropriate, as I will discuss further in 'Infestation of bark beetles' and in 'Reasons for decision', to consider a substantial increase in the harvest level in order to attempt to control the rate of spread of the beetle, and to capture at least some of the otherwise lost economic value.

The specific issue of the effect of the beetles, and of higher levels of harvest, on the forest cover requirements of the Lakes LRMP, is addressed below, under 'Bark beetle infestation'.

**- community dependence on the forest industry**

The socio-economic analysis included in the March 2001 Lakes TSA analysis report notes that the TSA is heavily dependent on the forest industry, with about 43 percent of residents' income derived from forest based employment. I have read and am familiar with this section of the report, which states that, if fully harvested and processed, the current AAC for the TSA could support approximately 739 person-years of direct employment, and another 244 person-years of indirect and induced employment, within the TSA. A harvest rate of 3 million cubic metres per year in the first decade, if fully harvested and marketed, could support approximately 1478 person-years of direct employment, and another 489 person-years of indirect and induced employment, an increase of 984 person-years from the level supported by the current AAC. The report concludes that under these conditions, based on multiplier coefficients, an increase in harvest level to 3 million cubic metres could increase total direct and induced employment in the province by about 2535 person years, about 46 percent of which would be direct forestry jobs. If the beetle infestation and the increased harvest level were to last ten years, and if adequate markets supported the economic feasibility of harvesting the entire increase, the cumulative change in total government revenues is estimated, based on current stumpage rates, at approximately 77 million dollars per year.

**- public concerns about, and support for, an increased harvest level**

In public input to this determination, a number of submissions expressed concerns about the negative implications higher harvest rates could have for: tourism; caribou habitat; log prices; the integrity of the Lakes LRMP; the creation of an even-aged monoculture of pine that would set up the TSA for another, potentially greater infestation; lower stumpage rates; loss of old-growth for value-added products; lack of sustainability in planning leading to ineligibility for certification and possibly to market boycotts; and the precedent for other districts to seek AAC increases, leading to a regional reduction in stewardship. An almost equal number of submissions expressed support for an increased AAC, generally to 3 million cubic metres, to reduce the effect of the beetle epidemic, minimize unsalvageable timber losses and return infested areas to restocked productive states as soon as possible. Two industry submissions advocated an AAC higher than 3 million cubic metres if necessary, to ensure the harvest of all beetle-attacked trees.

Elsewhere in this document I have addressed caribou habitat, the LRMP and log prices. I will respond here briefly to the other identified concerns. Scenic and other values for tourism will be affected in any case by the infestation, and I am advised by district staff that in certain areas consultations have already been held with stakeholders to determine the best course of action locally. Regarding the infestation of future forests, the combination of beetles and fire in the past has doubtless contributed to the forests' susceptibility to the current infestation, as has the accumulation of older wood through fire suppression in more recent years, and future infestations are probable with or without higher levels of control and salvage harvesting. As noted elsewhere, the intention of

harvesting more 'green-attack' timber is to extend the time required by the beetle to infest all the susceptible pine, and thus to increase the likelihood that a weather event could occur to stop the beetle before all the pine becomes infested, thus improving the chance of more healthy forests for the future. The salvage harvesting will also recover dead trees and maintain economic benefits. Stumpage rates are a matter over which I have no direct discretion in determing AACs. While I acknowledge the potential for a variety of stumpage rates to apply in this area, depending on the quality of the timber involved and the timeliness of its salvage, I must point out that this is not under my direct administration , not is it a direct or influential consideration in my determination. Rather, although any given harvest level will have unique revenue implications, I must emphasize that my primary consideration in this decision is with respect to forest health. As for the loss of old growth, the beetle is already rapidly damaging its value for particular applications, and until this slows markedly, as time progresses there will be fewer live trees to grow old. In fact, if harvesting does slow the rate of spread, this would further help to maintain old growth by reducing the loss of such stands to the beetles. To the extent that unsalvaged attacked wood holds value for some purposes, large volumes are projected to remain on the timber harvesting land base for many years, even with higher harvest rates. With respect to sustainability, provided care is taken in employing suitable harvesting systems in sensitive areas, as is integral to the beetle management strategy in the Lakes TSA, increasing the harvest level to avoid extended regeneration delays is in fact one important way to ensure future forest health and productivity—both important criteria of sustainability. In the 'working forest', good stewardship includes the removal of infested trees and of dead and dying timber that could compromise future productivity. Successful stewardship depends on the responsible application of a variety of approaches. Although contentious to some, retaining undeveloped protected areas such as Tweedsmuir Park is also an important component of stewardship.

With respect to the suggestion to increase the AAC beyond 3 million cubic metres, I am advised that this would be beyond the capabilities of existing administrative and processing facilities at this time.

### (c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities;

As detailed in the March, 2001 timber supply analysis, processing facilities in the TSA rely on the Lakes and other TSAs, TFLs, woodlots, and private lands in the area for their timber supply. Currently about 60 percent of the AAC for the Lakes TSA is processed locally, and the remainder helps to support processors located throughout the region and the province. Processing facilities in the TSA include 5 sawmills (one of which, in Burns Lake, is one of the largest in the province) and a remanufacturing plant. Staff of the BCFS Lakes Forest District and Prince Rupert Forest Region advise me that sufficient mill capacity exists to process a large increase in allowable cut by the addition of extra shifts. I am advised that to date, local interest has been expressed in processing additional volumes of beetle-killed timber totalling 330 000 cubic metres, as value-added manufacturing, dimensional lumber and house-building logs, and that First Nations have

also demonstrated interest in acquiring up to 295 000 cubic metres of tenure and economic opportunity.

From discussions with BCFS staff, who have discussed mill capacities with local mill management, in general I am satisfied that, if suitable markets can be found, the additional volumes of harvested wood under the contemplated increase can be processed in the existing facilities either in the region, or dispersed into the flow of timber for processing at various locations within the province.

## (d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia;

I have reviewed and considered the Minister of Forests' expression of economic and social objectives of the government for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). This letter and memorandum together include references to forest investments, forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability. The objectives include specific reference to the importance attached by the government to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests. In my view, the current intention to judiciously target increased harvest activity at recently infested timber in an attempt to diminish the rate of spread of the MPB is consistent with protecting major elements of the health and productivity of the forest for the long term, and is thereby consistent with the expressed objectives of the government.

## (e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

**- Infestation of bark beetles**

In this AAC determination I have placed considerable weight upon my detailed review of information related to the current serious infestation of bark beetles in the Lakes TSA. Some important considerations and analysis related to the implications of alternative harvest rates that may be employed as a management response to the current infestation, are presented above in the section 'the short and long term implications to British Columbia of alternative rates of timber harvesting from the area'. An understanding of that section is an essential complement to the further considerations presented below and in 'Reasons for decision'.

Under 'normal' conditions, the annual unsalvaged losses in the Lakes TSA, as incorporated in the base case analysis, are estimated to be 2819 cubic metres from fire, 10 800 cubic metres from insects, and 18 357 cubic metres from blowdown, for a total of 31 976 cubic metres. These fixed estimated amounts were subtracted from all harvest forecasts projected in the analysis report.

Current conditions in the TSA are far from 'normal'. Two insect species have created serious infestations, primarily in three areas of the TSA. The mountain pine beetle (MPB) has established populations that are endemic (that is, at high but not unnatural levels) in two thirds of the TSA, but are at epidemic (unnaturally high) levels in areas spreading northward from the south boundary of the TSA with Tweedsmuir Park. A currently escalating spruce bark beetle infestation is located mainly in the north and central portions of the TSA, while the south is relatively free of the insect.

***- the mountain pine beetle***

The mountain pine beetle (MPB), *Dendroctonus ponderosae* Hopkins (Coleoptera: Scolytidae) is widely considered to be the most damaging of all the insects that attack lodgepole pine in western Canada. The insect is a small, cylindrical-shaped bark beetle that kills mature trees by boring through the bark, mining the phloem—the layer between the bark and the cambium or inner wood of a tree—and interrupting the flow of nutrients up the tree stem. Details of its life cycle and its devastating power in destroying forests are presented in Appendix 3 to this document, *Forest Insect and Disease Survey, Forest Pest Leaflet No. 76*, a Forestry Canada publication, from which the following extract is taken:

Tree foliage begins to dry out as soon as the conduction of water up the tree is interrupted. As a result, the color of the foliage on infested trees gradually changes from bright to dull green. This early symptom in the lower crown will often become visible 2-3 months after attack. However, more distinct color changes occur during the onset of the growing season the spring following attack. Most lodgepole pine change from yellowish green to an orangey red by July and rusty brown by late summer. At this time most of the beetles will have left the tree. Other tree species display varying color patterns: ponderosa pine seldom turns red but develops more of a straw color, while white pine tends to become bright red. With time, retained foliage color becomes more dull, and most of the foliage drops in 2-3 years; this will vary from species to species and with weather conditions. These rapid and distinct color changes are used to schedule aerial mapping of recently attacked trees.

The mapping of mountain pine beetle attacks in stands of predominantly lodgepole pine is usually carried out to show the three stages of advancement through the following colour changes:

- '*green-attack*' in the first year, during which the insect migrates to and establishes 'brood trees' (where larvae will later mature into adults and eventually spread again to surrounding trees)—this stage is less readily identifiable visually from a distance than are the later stages;
- '*red-attack*' in the next year, beginning in spring, when the already-attacked trees are obviously dying and clearly identifiable visually from a distance and from the air;
- '*grey attack*' in subsequent years when the trees are left standing dead without needles.

In the area subject to *endemic* MPB infestation in the Lakes TSA, pine trees older than 80 years are being attacked. Approximately 100 000 cubic metres were harvested during the past year in efforts to contain the MPB's expansion.

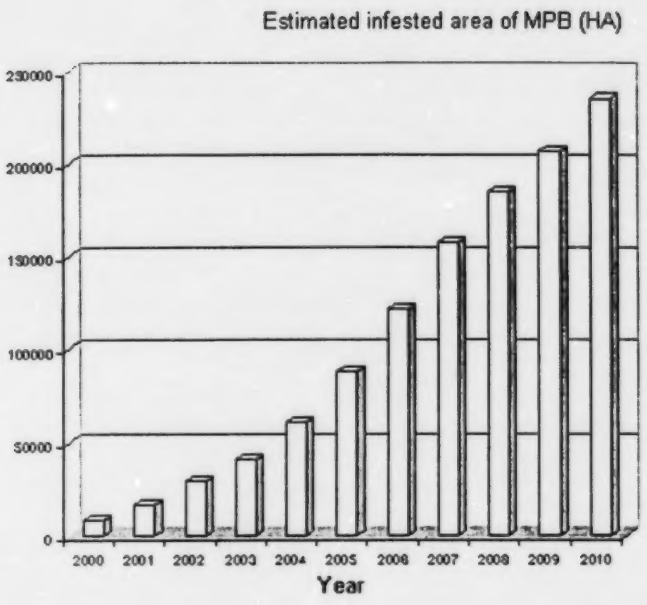
In the area subject to *epidemic* MPB populations, the infestation appears to have begun in 1994 in the adjacent Tweedsmuir Park, where very little management has been applied to control the spread of the beetle populations, which are now advancing to the north and east through much of the TSA. In 1998, about 800 hectares of 'green-attack' infestation appeared in the TSA (with no' red attack' by then, indicating a recent attack); this affected roughly 200 000 cubic metres of mature harvestable timber. In 1999, the affected volume was 900 000 cubic metres. With all licensees in the South Ootsa area completely committed to harvesting MPB-attacked trees, 700 000 cubic metres of this affected timber were harvested. However, experience shows that each 'red-attack' tree in the worst-hit areas can lead to lead to as many as 100 'green-attack' trees, and despite the focussed harvesting, by 2000, the infestation in the South Ootsa area had grown to 1.8 million cubic metres, with 10 000 infestation centres south of Cheslatta Lake. The infestation in these areas is sufficiently intense that all pine trees 60 years of age and older are being killed, and immature trees only 40 years old are being attacked, while in endemic areas the beetle will only attack pine trees over 80 years of age.

***- rate of spread***

The leading edge of the epidemic infestation consists of multiple infestation centres of zero to five hectares, which subsequently fill in and produce the larger infestation blocks now established closer to the park. The affected timber volumes are already more than doubling annually. Currently the ratio of 'green-attack' to 'red-attack' trees varies from the 100-to-one observed in the areas of highest infestations in southerly areas, to ten-to-one in the more northerly advancing fringe areas. (That is, each year, beetles from one visibly red and dying tree will reach and attack from 10 to 100 new trees.) For the purposes of modelling the impact of the MPB in the TSA, a rate of spread based on a conservative average ratio of 10-to-one was used.

Predictions from trends over the past three years, based on the volume infested, the distance advanced by the MPB, and the susceptibility of forest stands, indicate that by the year 2005, the volume affected by 'green-attack' would be 19 million cubic metres (on 87 814 hectares) and by the year 2010, 35 million cubic metres (on 235 307 hectares).

The following graph indicates very roughly the dimensions of the spreading infestation. It should be noted, however, that it is very difficult to predict future outcomes with certainty, so the results of the applied approach should be viewed simply as an extrapolation of past trends. Many other factors will come into play in determining actual future outcomes, but despite the consequent uncertainty, for now this approach is reasonable and reflects a responsible use of information gained to date.




If current spread rates continue, even with an increase in harvest level to 3 million cubic metres, by 2010, over 235 000 hectares of the timber harvesting land base in the Lakes TSA are currently projected to experience some degree of infestation by the MPB. The current rate of spread as incorporated in the timber supply analysis was assumed to be an annual doubling of the affected area. From recent field observations this now appears to be a conservative estimation of the expansion rate.

***- managing the infestation***

The basic strategy for managing the MPB infestation in the Lakes Forest District has four components, one for each of three action zones—the endemic zone, the transitional zone and the epidemic zone—and one for protected areas. (The relationships between these strategies and the LRMP are discussed in the section following.)

In protected areas the BCFS and parks ministries coordinate efforts in single tree removal, falling and burning, and single-tree pesticide. In the endemic zone, aggressive management is applied, including conventional clearcut harvesting, single tree removal, falling and burning, and single tree pesticide. In the transitional zone, very aggressive management is applied to reduce the rate of spread of the infestation using the same techniques as in the endemic zone, but a 4-hectare maximum clearcut and 70-percent retention are respected. In very high value caribou habitat and in backcountry lakes 'light-on-the-land' practices are employed. In the epidemic zone, the aggressive approach is relaxed, and conventional harvesting and small clearcuts only are applied, to reduce the numbers of the beetles.

Forest entomologists in several BCFS Forest Regions have confirmed that the strategy of aggressively attacking the leading edge of the infestation is a valid option. Lakes Forest District staff have been targeting 'green-attack' timber for five years, and believe this strategy to have been successful in preventing a higher rate of spread than the current approximate annual doubling in area. District staff consider it likely that without a significant weather event all the susceptible pine in the TSA will eventually be attacked, but that if a higher harvest rate is applied to the leading edge of the infestation, a longer period will be required to reach this condition. This would increase the chances of a climatic event that could reduce MPB populations to endemic levels, with the obvious benefit that more live older timber would then remain on the landscape at the end of the epidemic infestation.

The strategy for managing the spruce bark beetle infestation, for which there is no distinction between epidemic and endemic areas, is to leave no unsalvageable losses. This beetle population is expected to grow in 2001, then, if treatment objectives are successful, it is projected to decline to normal levels by 2005.

***- meeting the requirements of the LRMP and the Higher Level Plan order***

In the endemic zone, as outlined in a letter from the District Manager, licensees are expected to carefully consider the LRMP strategies and objectives in their operational plans. In the epidemic zone, the LRMP objectives and strategies are unaltered despite the killed timber, in that dead structure will be left in constrained areas, and while salvage opportunities will be considered, access roads in sensitive areas will be decommissioned to reduce access by predators and to re-achieve the integrity of zones or specific values, such as backcountry lakes. In the transitional zone, the beetle has already pushed some cover requirements of the LRMP to the limits, such that any further harvesting there would be inconsistent with the LRMP as approved. However, I am advised that in view of the severe infestation and the threat to future productivity of the forest, the LRMP Implementation Subcommittee has acknowledged the severity of the current infestation and supports the District Manager and the Designated Environment Official in jointly exercising some flexibility to deviate from the details of the LRMP and the HLP. This flexibility is consistent with the LRMP and is explicitly permitted by the HLP order. The timber supply analyst has concluded that the only adjustments needed to the originally approved LRMP requirements in order to implement a 3-million cubic metre AAC are the relaxing of early seral requirements in the low-value habitat areas of the Caribou Migration Corridor—which are equivalent to normal adjacency requirements in the general management zone—and the reduction by one class of each of the visual quality objectives, such that the 'retention' objective is treated as 'partial retention', and 'partial retention' as modification. I understand that these adjustments have been discussed with the LRMP Implementation Subcommittee, and under the current extreme and inevitable circumstances are considered to be reasonable. I am advised that the maximum AAC that can be attained without any adjustment to the LRMP is approximately 2.6 million cubic metres. However, even at this level some of the LRMP values are likely still at risk, primarily from changes to age class and stand structure resulting from the beetles rather than from harvesting in response to the beetles.

***- the need for a higher rate of harvesting***

The District Manager has informed me that the entire harvest in the Lakes Forest District is already dedicated to removing green attack trees, that cut control allowances are maximized, and that the current AAC has become an administrative barrier to applying the harvest at a rate adequate to further reduce the rate of spread of the beetles. A higher harvest rate is also needed to begin harvesting some of the very high volumes of timber projected to be killed, before their merchantable value is lost, and to provide for the removal of some of the large numbers of dead trees that will otherwise become an impediment to prompt regeneration and could lead to widespread extended regeneration delays, followed by a proliferation of marginally productive forests. In all of this, the LRMP and habitat requirements must be respected and given due consideration.

In considering the merits of various approaches to forest management in the Lakes area in this very difficult situation, with reference to the range of alternative forecasts discussed above in 'The short and long term implications…', I have reasoned as follows.

Alternatives 1, 2 and 3 are unrealistic in that they make no accounting for the already devastating impact of the beetles. Alternatives 4 and 5 provide for the largest increase currently considered manageable within the administrative and processing capacities of the district and region. They would also provide for the greatest currently feasible level of intensive targeting of the 'green-attack' trees in the fringe areas of the infestation, which is considered a valid option by regional entomologists. Whether the subsequent 'step-down' in projection 4 would become a more appropriate measure than the full, direct reduction in projection 5, respecting short- and mid-term implications, could be more reliably assessed in a future analysis with the benefit of more operational history in dealing with the beetles. Either of the moderate or best scenarios in projections 6 and 7, would be preferable, but each depends on the uncontrollable factors of weather and beetles. In comparison to the 3 million forecast alternatives, both of the 'do nothing' alternatives, projection s 8 and 9, would result in an additional volume of unsalvaged timber in the order of roughly 13 million cubic metres on the landscape after 10 years. The Forest District is committed to managing the landscape sensitively, with consultation, and within the requirements of the LRMP except for the accepted variances with respect to VQOs and early seral requirements in low-value caribou habitat, necessitated by the beetles. At this point in my considerations, as discussed further in 'Reason for decision', I am satisfied that increasing the allowable harvest level to 3 million cubic metres is a reasonable means by which to attempt to modify the rate of spread of the beetle and to reduce the overall amount of unsalvaged losses in the TSA. Projection 10, also discussed in 'Reasons for decision', illustrates some adjustments to projection 4 which I have considered in reaching this conclusion.

***-future recurrence of infestation***

Whether, when and to what extent an MPB infestation will reoccur in the TSA in future cannot be predicted. However, because extensive areas of young pine regenerating after the current infestation will not be susceptible again until maturity, unless a weather event concludes the current outbreak rapidly, leaving much of the current mature pine intact, it is reasonable to conclude that the most serious effects could be primarily in the longer

term. Short-term harvest levels will not change the possibility of future outbreaks. The outcome of the current outbreak will still be a large area in one age class that results from stand initiation by both natural regeneration and planting. This large area will age together and become susceptible to beetle attack at more or less the same time in the future when it reaches maturity. This identifies a definite need to explore management strategies that can reduce the risk of future outbreaks in these new stands. For now, since no specific accounting for the possibility of future infestations was made in the analysis, I have considered this issue to represent an unquantified risk to longer-term supplies, as addressed in 'Reasons for Decision'.

## Reasons for Decision

In making my determination of a new AAC for the Lakes TSA, while the implications of the current beetle infestation have formed a major part of my considerations, I have considered all those factors required to be considered under section 8 of the *Forest Act* (attached as Appendix 1). In these considerations I have been assisted by a number of timber supply projections for the TSA. Those which have been of primary assistance to me are described and discussed in the sections 'alternative harvest flows' and 'bark beetle infestation'. In deciding among the alternative harvest forecast projections, in the sections 'alternative harvest forecasts' and 'bark beetle infestation' I have given my reasons for accepting the three million-cubic-metre increase as incorporated in the 'worst-case' scenario as a suitable reference on which to base my considerations for this determination.

My considerations in determinations under section 8 typically serve either to (i) verify the assumptions incorporated in the timber supply analysis and thus the reference forecasts of the timber supply based on these assumptions, or (ii) to identify particular factors which, considered separately, indicate that the timber supply may actually be either greater or less than that projected in the reference forecasts.

For the Lakes TSA, from my detailed review of the comprehensive information presented to me at, and subsequent to, the AAC determination meeting for the Lakes TSA, held in Burns Lake on May 2 and 3, 2001, from my discussions based on that information, with staff of the BCFS and MELP (now the Ministry of Water, Land and Air Protection), and from my consideration of the summarized public input relevant to this determination submitted through the timber supply review process, I have found the following.

A number of the factors considered were incorporated and represented in the timber supply analyses by data and assumptions that accurately and adequately represent current land use and forest management practices. Those factors which, for this reason, I consider to have been adequately documented earlier, in the data package and information report, the timber supply analysis or the public discussion paper, are identified as such in the preceding 'Considerations' sections.

The remaining factors, discussed below, are those which I have identified as indicating some degree of under- or overestimation in projected harvest levels. As in most AAC determinations, some of these factors can be quantified and their impacts assessed with reliability, while others may influence the timber supply by introducing an element of risk or uncertainty to the decision, but cannot be quantified reliably at the time of

determination. These latter factors are necessarily accounted for in determinations in more general terms.

I have identified the following factors as reasons why the projected timber supply may have been *under*estimated in the analysis to degrees that may be quantified:

- *Problem forest types:* The exclusion from the timber harvesting land base of problem forest types in immature stands was based on a site-index cut-off. In a survey of 1400 hectares so excluded, 80 percent in fact marginally exceeded the cut-off requirement. This implies an underestimation of 1120 hectares in the timber harvesting land base. Because these are juvenile pine stands, their inclusion does not mean they are available to cut in the short term, but does represent a corresponding small underestimation in the projected timber supply in the mid and long terms.
- *Land use: conversion to agriculture:* Crown forested land is being harvested and converted to agricultural use at an estimated rate of 50 hectares per year. This was reflected in the analysis by an assumption that this rate of conversion will continue for the next four decades. I recognize the legitimate attempt to account for this conversion at this time, but I note that this conversion is not compelled by the LRMP or otherwise. Therefore, to the extent that the land in question has not yet been removed formally from the TSA, further harvesting could still take place there until the status of the land and its ownership code have changed. For consistency with my stated guiding principles, I must consider the current accounting in the analysis to be premature. On this account, the timber harvesting land base has been underestimated in the analysis by approximately 2000 hectares, or roughly 0.4 percent, which applies to the projected timber supply throughout the forecast period.
- *Not-satisfactorily restocked area (NSR)—non-commercial cover*: Of the Not-Satisfactorily-Restocked land in the inventory file, 711 hectares are considered to be non-commercial cover. No specific deduction was made on this account in deriving the timber harvesting land base, but in the analysis these hectares were not assumed to contribute to the timber supply. However, it is likely that the Operational Adjustment Factor OAF1 applied in the analysis, although not specifically intended to account for non-commercial cover, would already have included losses of productivity such as are attributable to these hectares, particularly if they occur in small patches and are included in cutblocks. On this account the timber harvesting land base has been underestimated by roughly 0.1 percent.
- *Utilization—stump height*: The utilization standards in the TSA include a stump height of 30 centimetres, which was also incorporated in the analysis. An Enhanced Forest Management Pilot Project study for one major licensee showed the achievement of lower stump heights as standard practice, and Lakes Forest District staff agree that due to the mechanization of harvesting, stump heights as low as 15 centimetres are regularly attained on at least one third of the TSA. If a stump height of 15 centimetres were to be applied consistently throughout the TSA, a 2-percent increase in timber supply would result throughout the forecast period. In isolation from other considerations it would be inappropriate to make a corresponding adjustment to the AAC based on this difference, unless and until the

shorter stump height were to become a mandatory requirement in the TSA. However, in context of the already contemplated substantial AAC increase to deal with the beetle infestations, and in recognition of the fact that current logging practices generally achieve this outcome, I consider it appropriate to recognize this factor as indicating the availability of approximately 2 percent more timber than forecast, in all time periods.

- *Green-up period*: Studies of early height-growth for pine in the TSA and information from the BCFS Integrated Silviculture Information System (ISIS) indicate that green-up periods for various management zones may be two to seven years shorter than assumed in the analysis, depending on the zone. This finding is consistent with recently published green-up reference ages based on field data for many areas of the province. When applied, the appropriate changes result in a cumulative increase of 30 000 cubic metres or 1.8 percent per year in the projected maximum non-declining harvest forecast. In the 'worst-case' and similar forecasts, this would apply to the mid and long terms, but not to the short term.

The following factors have been identified in my considerations as reasons why the timber supply projected in the reference forecast may have been *under*estimated to a degree that may not be readily quantified with reliability:

- *Duration of merchantability of attacked trees*: For the analysis it was assumed that timber would remain merchantable for only five years after attack. This assumption was applied in the model by dividing the forecast into discrete five-year periods and assuming that all timber killed during the first five years must either be salvaged during those same five years, or completely lose its value. The same condition was applied to the second five-year period. Under this assumption, even at the proposed elevated harvest level of 3 million cubic metres per year, after ten years a projected 19 million cubic metres of standing, dead, unsalvaged volume remained on the landscape. This resulted in part from assuming that none of the timber killed in any of the first five years would remain available for harvest during any of the second five years. In fact, if attacked trees retain value for only five years, it is reasonable to assume that timber attacked in year three, for instance, would retain some harvestable value in year eight. From this, I believe the analysis was overly constrained in its application of the five-year assumption. The actual duration of retained merchantability must remain unknown until defined by experience, and could be longer than five years. Sensitivity analysis shows that if merchantability were in fact retained for ten years, this would increase the projected mid-term supply by a substantial 200 000 cubic metres per year. From these considerations I believe that the mid-term timber supply has been underestimated to some extent, even if the merchantability of attacked timber is retained for only five years, and to a potentially greater extent, if its value proves to be retained for a longer period.

- *Site productivity adjustments*: Based on the results of paired-plot studies in the TSA, site index adjustments for pine have been made and incorporated in the base case. Outstanding adjustments that remain to be applied across other species groups show a potential net four-percent increase on the basis of published OGSI and veteran studies. This result is uncertain, however, pending the generation of reliable local figures, which could be obtained from studies for either the Enhanced Forest Management Pilot Project or the Innovative Forest Practices Agreement. In the absence of these local figures, the general current indication is for unquantified but potentially significant increases in the mid- and long-term timber supplies. The faster growth rates will also bring more reliability to the assumptions made about minimum harvestable ages.

- *Select tree seed*: The use of select seed derived from seed orchards and production facilities was not factored into the analysis. Improved spruce stock has been in use in the TSA for some time, and the use of select pine seed began in 2000. With progressively more seed-orchard capacity coming into production, each five-year review is likely to show additions to the future timber supply from the higher growth rates associated with the superior seed. The result is a currently unquantifiable underestimation in the timber supply, beginning in the mid-to-long term when trees from the select seed will become harvestable. Based on current Class A seed use, this is likely to be in the order of one or two percent, and should be reviewed closely for the next timber supply analysis.

- *Not-satisfactorily restocked (NSR) area—rate of regeneration*: In the analysis 9000 hectares that are currently classified as NSR were assumed to be regenerated slowly over a ten-year period. In reality, most or all NSR will be regenerated within one to one and one-half years, resulting in a small underestimation in the mid and long-term timber supply.

I have identified the following factors as indicative of potential *over*estimations in the timber supply to degrees that may be quantified with some reliability:

- *Wildlife Tree Patches (WTPs)*: The land base requirements for providing WTPs were underestimated in the analysis for two reasons. First, in the analysis, the requirement was applied only to the IRM zone but in practice will be applied across all zones. Second, it was assumed that 75 percent of the required WTP area would come from outside the timber harvesting land base. This is not consistent with the current policy of projecting a fifty-percent contribution from outside the timber harvesting land base in interior regions of the province. Moreover, the ratio of 'non-contributing' to 'contributing' forest land in the TSA is low—due to the high productivity and operability of the land and the high merchantability of the timber. This means there is relatively little area outside the timber harvesting land base to meet the WTP requirement, which must therefore be met from land on the harvesting land base. Due to this, the size of the timber harvesting land base has been overestimated by 2.1 percent.

- *Aging of the forest outside the timber harvesting land base:* In the timber supply analysis, it was assumed by default that forests outside the timber harvesting land base would continue indefinitely to contribute to the seral stage forest cover requirements for landscape-level biodiversity objectives. In reality this will not happen, as beetles, fire, or a pathogen of some kind will inevitably disturb the stands at some point. To investigate the implications of this discrepancy for timber supply, a sensitivity analysis was performed in which it was assumed that all stands older than 250 or 300 years outside the timber harvesting land base reverted to age zero (i.e. they died or fell over) and began growing again. This assumption is obviously subject to uncertainty, but may be argued to provide a better account, over long periods, of the changing contribution of the forest cover in these stands to the biodiversity requirements in the TSA. Applying the assumption resulted in a reduction of 3 to 4 percent in the mid and long term from the harvest level in the 'maximum non-declining even flow' forecast. I accept this as a reasonable quantification of the effect of underestimating landscape-level biodiversity requirements in this regard.

I have identified the following factor as indicative of a potential overestimation of the timber supply to a degree that currently may not be quantified with reliability:

- *Percentage of harvest in 'green-attack' trees:* In the analysis it was assumed that only recently infested ('green-attack') trees would be harvested. In practice, gaining access to infested areas will inevitably entail harvesting at least some healthy trees, or salvage of dead trees that the beetles have already exited from. The total harvest may thus result in a smaller overall reduction in the rate of spread of the infestation than assumed. This represents primarily an operational challenge in effectively targeting the harvest. However, it could also mean that the rate of spread in the 'worst case' scenario is underestimated, such that more timber than anticipated may become damaged, with negative but unquantifiable implications for the timber supply.

- *Inventory update:* The inventory file that was used as a basis for the analysis was updated for depletions to 1994, and for growth and yield to 1998. To reconcile this with conditions current to 2001, it is necessary to adjust for the six years of harvest that have taken place at the actual recent and current harvest levels. Without this adjustment, the starting mature inventory is overestimated by over 7 percent, which on its own would likely indicate a lower mid-to-long-term harvest level than projected.

- *Identified Wildlife Management Strategy:* A number of the species at risk listed under the Forest Practices Code are found in the Lakes TSA, including bull trout, American bittern, sandhill crane, trumpeter swan, northern goshawk, fisher, grizzly bear and mountain goat. Aside from forest cover constraints applied in respect of grizzly habitat, no land base reductions or specific constraints on the timber supply were applied in the analysis to represent the special management required for these red- and blue-listed species under the approved provincial strategy. The strategy allows for up to a one-percent impact on the projected timber supply from these requirements, and in this respect I am accounting for up to a one-percent overestimation in the projected timber supply throughout the forecast period.

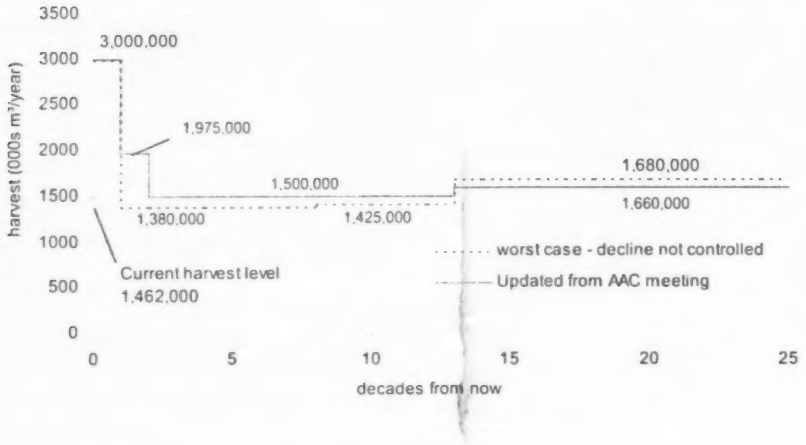
- *Visual quality objectives:* The maximum allowable disturbance limits as applied in the analysis conveyed a small error which resulted in an overestimation of 30 000 cubic metres annually or 1.8 percent of the harvest level in the mid and long terms.
- *Spatial modelling:* From two spatially explicit analyses performed in the TSA, BCFS staff concluded that spatial restrictions on the location of harvest blocks may reduce the long-term harvest level projected in the base case, but that there is sufficient flexibility in the short term to maintain the projected level at least over five years. I have carefully reviewed the capabilities and applicabilities of spatially explicit and implicit models in a general sense, from a 2000 study carried out by the BCFS Research Branch. Although spatially explicit models incorporate much more detail, timber supply projections can diverge greatly, depending on the assumptions of the model. Spatial models, and the data on which they are based, require further refinements before they can be used to conduct the complex, extensive analysis necessary to fully support AAC determinations.
- *Habitat supply:* Increased harvest levels mean that smaller amounts of forest structure, even in the form of attacked and dead or dying trees, will remain standing on the landscape in harvested areas. Accordingly, the risk to some forms of biodiversity will increase as objectives for particular habitats are maintained at reduced levels. Any point at which these risks may be deemed 'unacceptable' on behalf of society is extremely difficult to define and is interactive with evaluations of the economic risk of abandoning unsalvaged volumes of timber. In any event, at some juncture, in some areas habitat considerations will limit the appropriateness of increased harvesting as a means of meeting beetle management and salvage objectives. The resulting changes in forest dynamics will affect and constrain the timber supply in various ways, as for example through delayed regeneration in killed but unharvested areas, and consequent alterations to projected future age-class distributions. The biodiversity risks apply to some areas of the TSA—as for instance the caribou migration corridor and the high value moose and deer winter habitat—more than to others. For the TSA as a whole, in the absence of detailed information, I consider this factor to indicate a general and unquantifiable limitation on the projected timber supply in the mid and long-terms. I have discussed this further below.
- *Possible future recurrence of infestation:* The absence of accounting in the analysis for a possible future recurrence of an epidemic beetle infestation implies an unquantified overestimation of the projected timber supply in the longer term.

Subsequent to the AAC meeting, in view of these findings, I requested an additional analysis incorporating a combination of changes to input parameters reflecting the above information. Specifically, as also noted in the section 'alternative harvest rates' under projection 10, the changes accounted for: the inclusion of the previously excluded agricultural land; corrections regarding the NSR land and non-commercial cover; a correction to the green-up period; corrections to the assumptions about wildlife tree patches; an adjustment for the aging of forest cover outside the timber harvesting land base; a correction for the age of the data in the inventory file; a correction to disturbance limits for VQOs; and an increase in the duration of merchantability of timber after

beetle-attack. The projection also included a minor adjustment to deductions for roads, trails and landings.

I also requested that the projection include the adjustments identified by the timber supply analyst that were required to ensure that the 3-million-cubic-metre AAC could be implemented while meeting the requirements of the LRMP, as described under 'meeting the requirements of the LRMP and the Higher Level Plan order'. These include the relaxing of early-seral requirements in the low-value habitat areas of the Caribou Migration Corridor—which are equivalent to normal adjacency requirements in the general management zone—and the reduction by one class of each of the visual quality objectives, such that the 'retention' objective is treated as 'partial retention', and 'partial retention' as 'modification'.

The revised projection is shown below.




In this revised projection, shown by the solid line, the initial harvest rate of 3 million cubic metres per year was maintained for ten years, with a subsequent 'step-down' to 1 975 000 as in projection 4, and then to a mid term level of 1.5 million cubic metres per year (essentially the current AAC and higher than the 'worst-case' mid-term level of 1 425 000 cubic metres per year) after two decades. This level was held until an increase in decade 13 to a long-term level of 1 660 000 cubic metres per year, slightly less than in the 'worst case' (due primarily to corrected wildlife tree patch requirements and to accounting for aging outside the timber harvesting land base).

In essence, what the projection shows, with a reliability comparable to or improved from that of the original analysis projections is that, even assuming continuation of current rates of spread and damage from the beetle infestation for ten years, the harvest level in the TSA could be increased to three million cubic metres per year for 10 years without causing a future drop below the level of the current AAC.

It is also possible that the long-term harvest level could be reduced to some extent by future epidemics. These are impossible to predict at present, although the heightened risk of future epidemics is noted. Despite the difficulty of prediction, mid-rotation management strategies could at least partially reduce this risk. It must be remembered that the increased risk and the possible reduction in the long-term harvest level are primarily associated with the creation of a large area of single age class forest, which is primarily an outcome of the current infestation in the working forest.

The central question is, even if this revised forecast projects a feasible option, is it an option that lies in the best interest of the forest, including its wildlife, and of society? My reasoning in those respects, based on and summarizing the more specific considerations discussed in earlier sections, is as follows.

*Disadvantages:*

A higher cut level will bring changes to the nature and distribution of habitats additional to those that will unavoidably be incurred by the beetle. The changing structure of the forest, due both to beetles and to harvesting, will favour some species at the expense or disadvantage of others in particular areas. This can be managed to a degree by leaving unsalvaged dead timber in appropriate locations, by the use of a range of silvicultural systems, and by employing other mitigating measures such as the decommissioning of roads to curtail predator access, which can help to conserve sensitive habitat and backcountry areas. However, some degree of evolution in the composition of the biodiversity in particular areas is already inevitable, and will possibly be accelerated by a higher harvest rate.

A sudden large increase in the volume of timber harvested could reduce prices and render some aspects of control and salvage harvesting uneconomic in a period of soft markets. This could mean the full AAC might not be harvested, or that projected revenues may not be fully realized. The value to society of attempting to stabilize or decrease the beetles' ability to reduce the future productivity of our provincial forests is an important consideration in assessing the economic viability of control and salvage operations.

*Advantages:*

In general, a higher cut level will provide for the earlier regeneration of greater areas of healthy and productive forests for the future, and the use of a variety of silvicultural systems and consultative planning can ensure that, in the process, areas which are sensitive for various reasons are treated in the most appropriate manner. Thus, by a combination of approaches, including clearcut salvage harvesting in some areas, the leaving of all standing dead timber in some areas, and anything in-between—patch cuts, small and medium-sized openings, selection cuts and so on—any ecological impacts additional to those incurred by the beetles can be both minimized and focussed in the most appropriate areas. The most appropriate systems and treatments should be applied in conjunction and consistency with field research to determine the outcomes and impacts of various activities in particular contexts. If all this can continue to be carried out with due consultation, planning, and diligence, and within the requirements of the Lakes LRMP with the exceptions noted earlier in this document, all of which is currently the stated intention of the Lakes Forest District Manager, and if administration, processing

and markets are also adequate to the additional levels of development, the following very significant benefits, reiterated and summarised here from earlier considerations in this document, can be realized.

1. Regional entomologists have indicated that targeting harvest at the leading-edge infestation centres in fringe areas is a viable option in attempting to reduce the rate of spread of the MPB. The current AAC limits the application of this option.
2. To the extent that the rate of spread can be reduced, or prevented from increasing, by a higher harvest level, this will extend the period required for the beetle to attack all susceptible trees. This in turn will increase the possibility of occurrence of a weather event that could collapse the infestation to endemic levels, leaving a larger number of healthy, susceptible but unattacked trees on the landscape to contribute to healthy forests for the future.
3. The higher harvest rate will permit the salvage of a higher proportion of the dead and dying timber that could otherwise turn into a very serious impediment to prompt regeneration and to future productivity.
4. The higher harvest level will permit the salvage of at least some of the attacked timber before its value otherwise becomes lost. The difference between the volume salvaged by maintaining the current harvest level, and that salvaged by increasing the harvest to 3 million cubic metres per year for ten years is in the order of 13 million cubic metres.

*Synthesis*

District and regional staff have concluded that 3 million cubic metres is the highest harvest level that can be managed within the limits and capacities of the existing administration, processing facilities and infrastructure. At this point there is no benefit in attempting to exceed these capacities. At present, as I have noted, the entire harvest in the Lakes Forest District is already dedicated to removing green attack trees, cut control allowances are maximized, and the current AAC has become an administrative barrier to adequate harvesting that could help to reduce the rate of spread of the beetles.

As I have stated earlier, with continuing consultation and planning with stakeholders, with the gathering of habitat information and the application of a range of appropriate silvicultural systems, I believe the activities being contemplated at the three-million-cubic-metre-harvest level will leave the forests overall in a better, less damaged condition for the future than if no additional effort were made at this time to reduce the rate of spread of the beetles and to salvage appropriate areas of killed timber. For all of the above reasons I have considered the proposed temporary significant increase in harvest level to be an appropriate response to the current epidemic infestation.

The first step is to provide for the increased harvest level which will remove the current administrative barrier to undertaking the proposed activities. The second is to apply that increase in a way that improves the health of the forest while ensuring the most scientifically advisable approach to habitat conservation. This will help to protect the health and productivity of the forest for the future, and reduce the otherwise potentially high and costly levels of unsalvaged losses.

A harvest level of 3 million cubic metres provides the maximum currently manageable level of control of the rate of spread of the beetles, and hence the maximum practicable curtailment of the ultimate extent of the damage incurred by the beetle.

It is possible that the rate of spread of the beetles may increase beyond current forecasts, such that all susceptible pine becomes infested. The mid-term timber supply depends on the harvest of unattacked, mature timber until significant volumes of second growth timber become available for harvest in five to six decades from now. Since this mature timber would not be available under this scenario, the mid-term supply would be reduced. This is true regardless of the harvest level in the short term. The 'do-nothing' projections showed reduced mid-term timber supplies compared with the 3-million-cubic-metre AAC, because in those cases more area would remain unharvested, to regenerate naturally, producing lower timber volumes, and only after an extended regeneration delay,.

If it were logistically feasible, a further increase in harvest level above 3 million cubic metres would ensure prompt regeneration of a larger area, but this would only offset the mid-term reduction after several decades when these areas have grown sufficient volume to be harvested. However, a higher AAC to address the scenario of total infestation would likely be more difficult to implement without compromising the objectives of the LRMP, and would tend to magnify the possible disadvantages of a higher AAC noted above.

For all of these reasons I have concluded to increase the AAC for the Lakes TSA at this time by 1.5 million cubic metres. Since in this case I intend also to reduce the AAC for the TSA by the volume allocated in woodlot licences issued since the previous determination, that is by 38 000 cubic metres, the new AAC for the TSA will be 2 962 000 cubic metres. This level represents the full 1.5-million-cubic-metre increase contemplated throughout the determination.

## Determination

Having considered and reviewed all the factors as documented above, including the risks and uncertainties of the information provided, it is my determination that a timber harvest level that (i) accommodates objectives for all forest resources during the next five years and meets almost all the requirements of the Lakes LRMP excepting only those variances discussed with the LRMP Implementation Subcommittee and necessitated by the MPB infestation; (ii) reflects current management practices as well as the socio-economic objectives of the Crown, and (iii) works to diminish the overall extent of future damage by the MPB while (iv) providing for the timely salvage of some of the timber damaged by the MPB, can best be achieved in the Lakes TSA at this time by establishing an AAC of 2 962 000 cubic metres.

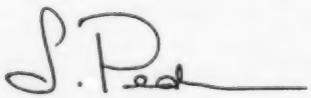
Effective August 1, 2001, the new AAC for the Lakes TSA will be 2 962 000 cubic metres. This AAC volume excludes all volumes in issued woodlot licences. This new AAC will remain in effect until another new AAC is determined, which must take place within five years of the present determination.

The following observation forms an integral part of this determination. Staff of the BCFS will monitor and apprise the chief forester of the condition of the MPB infestation, on the understanding that, if and when required, this determination may be revisited at a date earlier than required by statute.

## Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability of staff to undertake these projects is dependent on available staff resource time and funding. These projects are, however, important in helping to reduce the risk and uncertainty associated with key factors that affect the timber supply in the TSA.

- With assistance from regional staff, study the ecological value of leaving unsalvaged attacked timber in various habitat contexts.
- With assistance from regional staff, study the ecological implications of applying various silviculture systems in beetle-affected areas.
- Monitor the MPB with respect to (i) the ongoing achievement of LRMP objectives and (ii) the likely need for continued elevated harvest levels.
- Collect information on appropriate site index adjustments for species other than pine.
- Monitor regeneration delay and species composition for natural regeneration in unsalvaged beetle-attacked areas.
- Monitor the duration of merchantability of dead timber in beetle attacked areas.



Larry Pedersen
Chief Forester

July 23, 2001

## Appendix 1: Section 8 of the *Forest Act*

Section 8 of the Forest Act, Revised Statutes of British Columbia 1999, reads as follows:

**Allowable annual cut**

**8.** (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine a volume of timber to be harvested from each woodlot licence area during each year or other period of the term of the woodlot licence, according to the licence.

(7) The regional manager or the regional manager's designate must determine a volume of timber to be harvested from each community forest agreement area during each year or other period, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silviculture treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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## Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

**Purposes and functions of ministry**

**4.** The purposes and functions of the ministry are, under the direction of the minister, to

(a) encourage maximum productivity of the forest and range resources in British Columbia;

(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and

(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

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# Appendix 3: Extract from Unger, L. 1993. Mountain Pine Beetle. Forestry Canada, Forest Insect and Disease Survey, Forest Pest Leaflet No. 76, 7p

## Introduction

The mountain pine beetle, *Dendroctonus ponderosa*, a native pest, is the most serious insect enemy of mature pines in western Canada. In British Columbia, major outbreaks occurred in all areas with a significant pine component, except for the northern quarter of the province. Since the first recorded infestations in 1913, in the Okanagan and Merritt areas, major infestations have occurred in Kootenay National Park and the Chilcotin Plateau in the 1930s, on Vancouver Island during the 1940-50s, near Takla and Babine lakes in the 1950s, and through much of the southern interior, Chilcotin Plateau and the Skeena and Nass river areas in the late 1970s and 1980s. Well over 500 million trees were killed by the mountain pine beetle during the past 80 years.

Outbreaks generally last 8-10 years and severely deplete the pine component of forest stands; trees with a diameter greater than 25 cm are particularly susceptible. Extensive mountain pine beetle infestations hasten forest succession, change the age and diameter distribution of the pine components of the forest, and reduce aesthetic values. Infestations can also cause marketing and operational problems and environmental concerns when large volumes of dead pine are harvested either for control or salvage purposes.

Large reserves of mature pine forest are always at risk in areas climatically favorable for the beetle. Good access to susceptible forests is needed so that preventative measures can be taken and so that infested stands can be quickly treated.

## Hosts

The mountain pine beetle is distributed throughout British Columbia north to 56ø latitude. Infestations have been recorded from sea level to the highest elevations where the host species grow. Native hosts include lodgepole pine (Pinus contorta), ponderosa pine (*Pinus ponderosae*), whitebark pine (Pinus albicaulis), and limber pine (Pinus flexilis). Some exotic pines may also be attacked. Occasionally non-host trees such as Engelmann spruce (Picea engelmannil) are attacked, but beetle populations do not persist in these occasional hosts.

## Description and Life History

Adults are cylindrical, 3.7 to 7.5 mm long; teneral adults are light creamy-tan in color, changing to black when mature.

Eggs are pearly white, about 1 mm in size, and are laid singly in niches on both sides of the parent gallery.

Larvae are white legless grubs with red-brown heads, about 5 mm long in the fourth (final) instar.

Pupae are white at first, changing to light brown, about 5 mm long, with the external characteristics of the adult beetle visible.

The life cycle of the mountain pine beetle varies considerably. The normal cycle takes one year to complete; however, during warmer than average summers, parent adults may re-emerge and establish a second brood in the same year. Conversely, in cooler summers or at higher elevations, broods may require two years to mature. These variations in the life cycle may result in rapid increases in population levels, or conversely, sharp population decreases.

Beetle flights normally occur throughout July and into August, and generally peak in late July. Upon locating a suitable host, females bore through the bark to the phloem and cambium region,

and start construction of the egg gallery, usually on the lower 5 m of the bole. The first females that attack a tree emit an aggregating pheromone which attracts mainly males. The males in turn emit pheromones attracting additional females. This leads to a mass attack which overcomes the tree's resistance. The egg galleries are usually about 30 cm long but occasionally they may reach 90 cm. They extend upward parallel to the grain and usually score both bark and sapwood. Eggs are laid in individual niches 0.5 cm apart along both sides of the gallery, and are tightly packed with frass. Eggs generally hatch in 10-14 days. Larvae feed on the phloem in individual mines extending, under uncrowded conditions, about 13 cm at right angles to the egg gallery. Broods overwinter mainly as larvae. Larval development is completed in early summer of the following year. When larvae mature, they excavate an oval chamber in which they turn into pupae. Following a short pupation period, pupae become adults. Newly formed adults, called teneral adults, spend a brief period feeding under the bark before the mature adults emerge by boring through the bark and fly to living trees to commence another cycle.

Fungi, yeasts, bacteria and other microorganisms associated with the beetle are carried by them into the tree. Some of these microorganisms are pathogenic to the tree or the bark beetle, while others are beneficial to the beetle. Fungi, which are commonly introduced by the beetle and produce blue stain in the sapwood, commence growth in the phloem and xylem soon after the beetles start their galleries. As the fungi become established they interrupt the flow of water to the crown and reduce the tree's pitch flow, which is its main defense mechanism against beetle attack. Successfully established bluestain fungi will also retain moisture in the sapwood and prevent excessive dehydration of the phloem, which is essential for brood survival. The combined action of the beetle and fungi kills the tree. Teneral adults need to feed on fungal fruiting bodies to mature, and specialized mouth parts of the beetle ensure that emerging beetles carry fungi to living trees.

**Damage and Detection**

Infested trees can be detected through crown and external symptoms, but the mountain pine beetle can only be positively identified (and the success of an attack can only be positively determined) by looking under the bark.

External evidence of beetle infestation on the bole usually consists of (i) pitch tubes on the stem where beetles have entered the tree, and (ii) boring dust at the base of the tree.

The color of the pitch tube often indicates the success or failure of the beetle attack. Scattered pitch tubes that are whitish in color indicate that the tree has repelled or killed the beetle by pitch exudation. In contrast, numerous reddish brown pitch tubes usually indicate that the attack has succeeded. However, pitch tubes remain pliable for several years, so soft pitch tubes do not necessarily mean that a tree is currently under attack. Pitch exudation may not occur during periods of drought or when trees are stressed due to root rot or other reasons. However, trees that have been recently and successfully infested will have dry boring dust in bark crevices and at the base of the tree. The boring dust is produced only during the initial stage of gallery construction and, depending on weather conditions, it may rapidly become inconspicuous. Woodpecker activity will often be greatly increased in infested areas, and woodpeckers will leave numerous pecking holes and may remove sections of the bark.

Characteristic symptoms under the bark include a vertical parent gallery with a slight J-like hook at the bottom and evenly spaced larval galleries extending at right angles from the parent gallery. Galleries are tightly packed with sawdust. The phloem will be dried out and brownish, and the sapwood will usually be stained a bluish color due to the fungi associated with the beetle.

Tree foliage begins to dry out as soon as the conduction of water up the tree is interrupted. As a result, the color of the foliage on infested trees gradually changes from bright to dull green. This

early symptom in the lower crown will often become visible 2-3 months after attack. However, more distinct color changes occur during the onset of the growing season the spring following attack. Most lodgepole pine change from yellowish green to an orangey red by July and rusty brown by late summer. At this time most of the beetles will have left the tree. Other tree species display varying color patterns: ponderosa pine seldom turns red but develops more of a straw color, while white pine tends to become bright red. With time, retained foliage color becomes more dull, and most of the foliage drops in 2-3 years; this will vary from species to species and with weather conditions. These rapid and distinct color changes are used to schedule aerial mapping of recently attacked trees.

**Beetles Associated with Mountain**

A number of secondary beetles are associated with mountain pine beetle and at times these secondary beetles make diagnosis of the causal agent of tree mortality difficult. Secondary bark beetles generally do not successfully establish in healthy, vigorous trees.

Several engraver beetles (Ips pini, I. latidens and I. mexicanus) attack fresh windfelled trees, logging residue, and uninfested portions of the boles of trees killed by mountain pine beetle, as well as trees of low vigor caused by root rots, stem diseases, defoliation, etc. Occasionally, however, they may become destructive in apparently healthy trees, but infestations are usually short. Since a portion of the population overwinters in the duff, extreme cold winter temperatures, which can devastate mountain pine beetle population, are much less destructive to the Ips beetles. As a result, these engraver beetles, which increased along with the mountain pine beetle population, may continue at epidemic numbers for 1 or 2 years.

Ambrosia beetles (Trypodendron spp. and Gnathotrichus sp.) are wood or pinhole borers that infest recently killed trees, fresh slash, and downed material. Infestation by these beetles can be recognized by the small piles of white boring dust surrounding the points of entry into the wood or around the lower portion of the stem.

The red turpentine beetle (Dendroctonus valens) bores under bark near the root crown and produces large reddish brown pitch tubes around the base of the bole. This is the largest of the Dendroctonus species: larvae are up to 12 mm long, and the reddish colored adults generally are between 5 and 9 mm.

The lodgepole pine beetle (Dendroctonus murrayanae) attacks the lower metre of the stem forming an irregular vertical gallery with eggs laid in groups of 20-50 along both sides of the gallery. Larvae feed gregariously. Larvae and the reddish brown adults are only slightly smaller than the same stages of the mountain pine beetle.

Sour sap bark beetles (Hylurgops and Hylastes spp.) usually attack the stem near and below duff level. Adults are black or reddish, but tend to be shorter (3-6 mm) and more slender than mountain pine beetle.

**Management**

*Prevention*

The first step in prevention of mountain pine beetle outbreaks is to prioritize stands for preventive maintenance. To this end, risk and susceptibility rating systems have been developed combining the stand parameters associated with beetle infestations and the beetle pressure on a stand. Susceptibility increases in stands (i) with trees over 60 years of age (moderate susceptibility) and with trees over 80 years of age (high susceptibility), (ii) with trees over 25 cm in diameter, (iii) with a high pine component, (iv) with a density between 750 and 1500 trees/ha, and (v) at lower altitudes and latitudes. The risk of an infestation developing within a stand is based on its distance to the nearest infestation and its level of current attack. For example, stands within 3 km of an

active infestation and with more than 100 trees already attacked would be considered at risk. Risk factors can change dramatically within a year, while stand susceptibility changes gradually over a number of years.

Silvicultural treatments which help to reduce stand susceptibility include (i) reducing stand density to below 500 trees/ha, (ii) establishing an age and tree size mosaic within a stand or drainage, (iii) implementing a shorter rotation period, and (iv) establishing a species mix within a stand. The effectiveness of these measures may be reduced considerably in the presence of high beetle pressure, however.

Aerial surveillance,especially of moderate to high risk stands, will detect the initial phases of beetle invasion and allow for the early implementation of effective control measures.

Ground surveys should be conducted when pockets of discolored trees first appear in a stand to verify the causal agent and the status of the brood.

*Applied Control*

A variety of applied controls can be utilized, depending upon the extent of the beetle problem. In conjunction with controls, synthetic aggregating pheromones can be used effectively to concentrate beetle attack. This greatly improves the efficiency in locating newly attacked trees for follow-up treatment actions, or for containing most of an attack within a given harvesting area. Under specific conditions, mass trapping of beetles may prevent small local beetle populations from increasing or it may even reduce these populations to endemic levels. However, the effect of trapping becomes negligible when the beetle populations reach epidemic proportions.

During the initial phases of an infestation when only small infestation pockets are present, individual trees containing beetle brood can be treated by felling and burning, applying an appropriate silvicide to infested trees within 24 days of attack, application of a registered insecticide to the bole of infested trees just prior to beetle emergence, and the use of pheromone-baited, lethal (insecticide-treated) trap trees. Permits are required for such work in B.C. forests.

At intermediate infestation levels (up to about 100 trees per patch), small-patch logging can be used if good access is in place, and if beetle attack is concentrated naturally or through the use of pheromone baits. Beyond the intermediate stage, and when infestations exceed 10 ha, control becomes increasingly more difficult. In larger infestations the rate and range of beetle dispersion increases and any effective control program will require very extensive ground surveys to locate the green, newly attacked trees. Consequently, the only practical control measure at this stage is clearcutting well beyond the areas having red trees in order to remove trees containing beetles.

**Natural Control**

Resin flow and predation and parasitism are relatively ineffective in large infestations, but can be important in maintaining populations at endemic levels.

Resin flow is the tree's active defense mechanism against beetle invasion. It is effective in flushing out beetles (pitchout) or destroying eggs only when attack density is low, or when a high attack level is spread over a number of days. During periods of tree stress, such as drought, resin flow may be greatly reduced.

Predation and parasitism play a significant role in beetle population dynamics. Woodpeckers are the most conspicuous predators as they remove bark in search of beetle brood, in the process of bark removal they also reduce the survival rate of the remaining insects due to desiccation. Perching birds also consume large quantities of flying beetles. Some of the more commonly encountered insect predators include the clerid (checkered) beetles, and Diptera (various true fly species). Several species of wasps occasionally kill large numbers of mountain pine beetles.

Temperature can be an important factor in determining population levels during the course of an infestation. Optimum under-the-bark temperatures for brood development are between 20 and 26øC. Cool summers may delay beetle flight and subsequently slow brood development, which can affect overwintering brood survival. Early fall temperatures of -18ø will kill brood, while even less severe temperatures will kill eggs and larvae in the first three larval instars. The most cold-hardy stage, late-instar larvae, when conditioned for cold temperatures, cannot withstand temperatures below -37ø; temperatures of -27ø persisting for several days will kill a large portion of the population. Once the maturing larvae have resumed feeding in the spring they again become very susceptible to freezing temperatures. Since the impact of low temperatures is moderated by tree size, bark thickness and snow insulation, the duration of the cold period and snow pack is a critical factor to beetle survival.

Intraspecific competition affects brood production. High attack densities result in a more rapid rate of phloem desiccation; consequently, fewer adults emerge per unit area of bark surface. The adults which do emerge will also have a reduced capacity for egg production. Optimum attack densities appear to be between 3 and 10 per 1000 cm2 of lodgepole pine bark surface area, but it depends upon the thickness of phloem (food source). Food supply (phloem) is a main factor in regulating beetle populations. Beetles initially select larger diameter trees with thick phloem, in which populations can increase rapidly. As an infestation progresses and the larger diameter trees have already been killed, smaller trees with thinner phloem are attacked resulting in smaller broods. These trees will also dry out faster, leading to increased brood mortality. In general, when beetles attack trees under 25 cm in diameter, the number of progeny emerging will progressively become less with decreasing diameter.

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File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

**Re: Economic and Social Objectives of the Crown**

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
OFFICE OF THE MINISTER

Ministry of Forests

# MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

**Re: The Crown's Economic And Social Objectives Regarding Visual Resources**

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

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In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis*.

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests

# Lakes Timber Supply Area
# Timber Supply Review

# Summary of Public Input

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**July, 2001**

This is a summary of the public input received on the Timber Supply Review in the Lakes Timber Supply Area. This summary does not assess the feasibility or validity of the input or whether it relates to the clearly defined mandate of the chief forester in the allowable annual cut determination.

# Lakes Timber Supply Area

## Background

As part of the review of timber supply in the Lakes Timber Supply Area (TSA), two opportunities were provided for public input. The first followed release of the Lakes Timber Supply Area *Data Package* and *Information Report* in March 1999. The *Information Report* was a non-technical summary of the draft data and management assumptions that were to be applied in reviewing the timber supply for the Lakes TSA. A 30-day review period, ending April 6, 1999, was provided for the public to comment on these documents.

The B.C. Forest Service had planned to complete a timber supply analysis and release a new allowable annual cut (AAC) for the Lakes TSA before the end of 2001. However, due to the severe mountain pine beetle infestation, the Lakes Forest District asked the chief forester to carry out an immediate review of the AAC and consider a temporary AAC increase.

On March 22, 2001, the British Columbia Forest Service released the *2001 Lakes Timber Supply Area Analysis Report*. The public was encouraged to review and comment on the accuracy of the information in this document and to provide additional information during the 30-day review period that ended April 23, 2001.

This report summarizes the input received during both public review periods. This information was provided to the chief forester for his consideration when he reviewed the AAC for the Lakes TSA. The first section of this summary outlines the public review process implemented by the Forest Service, and describes the types of public input received. The second section summarizes the public input in sufficient detail to indicate the range of input received. The original submissions (with personal identifiers removed in accordance with the *Freedom of Information and Protection of Privacy Act*) can be reviewed at the Lakes Forest District office.

## Public Review Process and Response

Lakes District staff actively solicited public input on the Timber Supply Review in the Lakes TSA through the following actions:

- approximately 150 copies of the *Information Report*, *Data Package* and *Analysis Report* were mailed to stakeholders in the TSA, such as First Nations, licensees, local governments and the Land and Resource Management Plan resource council. Meetings or presentations were offered.
- the *Data Package* and *Analysis Report* were available at the district office in Burns Lake and the regional office in Prince Rupert; approximately 30 were picked up.
- newspaper advertisements were placed, advising of the availability of all documents for review by the public.
- copies of all the documents were made available to the local media.
- on March 23, 1999, a presentation was made to a representative from Burns Lake Native Logging and from the Burns Lake Band. On March 30, a meeting was held with a representative of the Ulkatcho First Nation.
- on March 25, 1999, a presentation was made to five representatives of the Community Forestry Committee.
- on April 24, 2001, a presentation was made to representatives of the Village of Burns Lake, the Regional District of Bulkley-Nechako and the Community Economic Development Association.
- referrals were made to the Ministry of Forests website where documents were available to download.

# Lakes Timber Supply Area

The Lakes Forest District received eight written submissions on the *Data Package* and 16 submissions on the *Analysis Report* (see Appendix 1).

## Public Input

In this section, public input on the information presented in the Timber Supply Review documents for the Lakes TSA is summarized under the following headings:

- Data Package (and Information Report)
- Timber Supply Area Analysis Report
- Other comments

### Data Package

#### Land Base Factors

The Lakes TSA Major Forest Licensee Interest Group (the licensees) comments on a number of factors that affect the size of the timber harvesting land base.

The licensees say the reductions for environmentally sensitive areas seem excessive and have nearly doubled since the previous Timber Supply Review. In particular, they express concern about sensitive soil reductions and caribou exclusions.

Since no land use decisions have been made for the Sutherland Valley and the Entiako area, the licensees say these areas should not be excluded from the land base for this analysis, but treated in a sensitivity analysis of the impacts of the Lakes Land and Resource Management Plan (LRMP).

With regard to the definition of sites with low growing potential, the licensees say a height threshold of 5.4 metres at 50 years seems low for spruce.

With regard to problem forest types the licensees make the following comments:

- the reduction in minimum height criteria for pine-leading types is significant and a sensitivity analysis is recommended.
- mixed balsam types older than 250 years should not be 100 per cent excluded because licensees have operated in some of these stands.
- deciduous volumes in coniferous-leading stands are excluded from harvesting but may overlap with exclusions for wildlife tree patches (WTPs).

With regard to deductions for roads, trails and landings, the licensees say there doesn't seem to be adequate consideration of road rehabilitation requirements, tree closure over roads and increased use of roadside harvesting systems.

#### Expected Rate of Growth

The licensees make the following comments on factors affecting estimates of managed stand volumes:

- initial stand densities of 2800 stems per hectare indicate an excessive amount of natural ingress; densities are closer to 2000 stems per hectare.
- the increase in the reductions in pine-leading stands to account for gaps in these stands is questioned.
- a rationale is needed for including stands less than 41 years old in managed stand yield calculations.

The licensees recommend a sensitivity analysis using culmination age (when annual growth is maximized) as the minimum harvestable age. The licensees also note that genetically-improved spruce seed has been used for some time and improved pine is coming on line. They say the Research Branch has

documented significant productivity gains from genetic seed improvements.

### Not-Satisfactorily Restocked Areas

The licensees question the 14 per cent reduction in Not-Satisfactorily Restocked Areas (NSR) to account for non-commercial cover (NCC). They say if the NCC patches are small and included in cutblocks, they may already be accounted for. If they are large and wrongly classified as NSR, then the reduction is appropriate.

### Utilization Standards

The licensees note that initial results from the Babine Forest Products Enhanced Forest Management Pilot Project show actual stump heights to be lower than the current 30-cm utilization limit.

### Wildlife

The submission from the licensees makes the following points regarding forest cover requirements for wildlife:

- the base case analysis should only consider high and very high value caribou migration corridor areas, similar to the previous Timber Supply Review (TSR1).
- the base case should only include moose and deer requirements used in TSR1.
- the very high value grizzly areas were identified during the LRMP and should only be considered as part of the LRMP sensitivity analysis.

### Riparian Management

The licensees say a rationale is needed for the application of riparian reductions. They suggest the reductions be applied across the entire land base for the base case analysis and where reductions are focussed in Biological Ecosystem Networks (BENs), a sensitivity analysis should be carried out.

### Unsalvaged Losses

The Forestry Committee of the Burns Lake & District Community Economic Development group (the Forestry Committee) says the *Data Package* does not provide a rational approach to estimating the volume of unsalvaged losses, and they provide details on what should be included. The committee says the information does not distinguish between endemic and catastrophic losses, or outline how these losses are accounted for. They say the opportunity to reduce unsalvaged losses through small-scale salvage operations must not be missed due to inadequate information.

### Socio-Economic Factors

The Forestry Committee says if there is an increase in harvesting, every effort should be made to provide opportunities that increase and enhance local employment.

An individual tourism operator says if the current trend of pine beetle infestation and increased harvesting continues, there will be no opportunity for other forest users and, in particular, ecotourism will have no future. This individual says their 15-year-old tourism operation has already lost (to logging) 80 per cent of the area opportunities they used to have.

A submission from Nature Trails Wilderness Lodge says it is very important that the area surrounding their lodge remains intact, as they thrive on the ecotourism market, selling wilderness recreation packages and a remote, wilderness lodge. Areas of particular importance are noted, and the submission asks which areas are planned for harvesting.

An individual submission says cattle grazing must always be considered because beef cattle are a major, and increasing, part of the economy in many parts of the TSA.

# Lakes Timber Supply Area

### First Nations

The submission from the Yekooche First Nation raises the following concerns:

- the fact that the Yekooche First Nation was not recognized as existing in the TSA is further evidence of the district's lack of understanding, recognition or respect for Yekooche and their aboriginal title and rights.
- no part of the Timber Supply Review process considers their aboriginal title or rights, which have never been ceded or surrendered.
- the area between Lake Babine and Cunningham Lake is very important for many uses (hunting, trapping, gathering, ceremonies, trails and burials) and they strongly disagree with any forestry activities there.

## Timber Supply Area Analysis Report

### Existing Forest Inventory

Fraser Lake Sawmills says the worst case scenario for the mountain pine beetle (MPB) outbreak shows a "pinch-point" in timber supply from the third to eighth decades, but does not show the impact to the log profile. The company says the reduction in minimum cutting ages may not be realistic if timber must come from stands that barely meet the new minimum criteria for height, age and site index. The company also says the assumption that its operation will be viable with shorter, smaller logs is very optimistic.

### Regeneration Delay

Fraser Lake Sawmills expresses the opinion that complete regeneration of unsalvaged pine stands may take as long as 20 years, not 10 years as used in the analysis. The company requests a sensitivity analysis using 15 years.

### Utilization Standards

Fraser Lake Sawmills says utilization standards should be modified to provide incentives that ensure priority is given to harvesting the best quality beetle-infested stands before the poorer ones, as well as to harvesting the highest quality portions of infested stands first.

### Non-Timber Values

The submission from the major licensee interest group (the licensees) notes that forest cover requirements are not applied in the first 10 years of the MPB scenario. They say the ability to remove these is questionable, both legally and in terms of the reaction of the environmental community (e.g., market boycotts).

Fraser Lake Sawmills says increasing the harvest level to three million cubic metres may not be possible if non-timber resource values must be managed to meet the objectives of the LRMP. The company says the MPB scenario assumes all constraints will be removed for the first decade and says unconstrained management is not a likelihood.

### Beetle Infestation

An individual submission predicts that if harvesting does not keep up with the beetles, forest fires will sweep through, burning most of the forests and creating a sea of immature pine not available for harvesting for 80 years.

Several submissions question the concept of the "war" against the beetles, noting that some experts say beetles are a natural part of the cycle of the forest and are integral to forest ecology. These submissions question the evidence that logging infected areas is any solution to the MPB infestation. One submission says fire is the best tool. Others say that allowing natural processes to proceed will protect biodiversity (such as important old-growth attributes and wildlife habitat) and produce a more resilient future forest with the landscape-level complexity that helps keep beetle populations in check. Trials in

retention harvesting are recommended by one submission.

The submission from the David Suzuki Foundation says salvage activities should be part of an ecosystem-based approach to beetle management that produces stand structures and landscapes that reflect the complexity of natural forests. Several recommendations are provided.

### Socio-Economic Factors

Two submissions say the timber supply from the Lakes TSA is very important to the stability of the Village of Fraser Lake since a major employer, Fraser Lake Sawmills, derives more than half its licensed log supply from the TSA.

The licensees say the socio-economic analysis inappropriately assumes that doubling the harvest will double government revenue, noting the value of the timber resource will be reduced due to increased operating costs, poorer log quality and decreased product values. The licensees say appropriate timber pricing is critical to industry's ability to effectively deal with the infested volume.

Vanderhoof Specialty Wood Products says increasing the harvest level when demand for purchase logs is static will drive prices down further. The company says a reallocation of Small Business Program wood from other TSAs will provide the increased cut needed without harming the Section 21 value-added industry and small business loggers.

Another submission says the Lakes TSA is surrounded by other TSAs under attack by pine beetles, and federal and provincial planning must coordinate vast changes from a lumber and pulp economy to a more diversified wood product and wood energy economy.

Two submissions make the argument that doubling the AAC now will create a dependency on this wood supply and produce an economic falldown with associated job losses and negative community impacts in ten years. These submissions say the long-term economic outlook is better if the forest is left unsalvaged because the natural forests will be more resilient and more able to support a diverse economy including both the timber and tourism industries.

## Other Comments

All submissions comment on factors or issues other than those specifically covered by Timber Supply Review documents. These comments are summarized in this section.

### Timber Supply Review Process

Ten submissions comment on aspects of the Timber Supply Review process itself. The comments include:

- it would have been prudent to await the results of the LRMP timber supply review before undertaking this one, so that any plan needed to mitigate a timber supply shortage could have been considered.
- it's good that opinions of people in the forest industry are being sought as in the past many decisions have resulted from pressure by environmentalists with no knowledge of the local situation.
- the LRMP does not constitute current management, and changes to timber supply resulting from the LRMP should be handled through sensitivity analyses and the results presented to the public so impacts can be clearly understood.
- the speeded-up process is not justified and the public consultation process is just window dressing.
- the Forest Service is to be commended for the thoroughness of the *Analysis Report.*
- the analysis does not include information and results from the Babine Enhanced Forest Management Pilot Project, some of which demonstrate significant upward pressure on timber supply.

- there has been no public discussion about the long-term effects of increasing the AAC, such as what the forests will look like, what options are left for other forest users, etc.
- the proposed increase is simply a salvage proposal that matches the milling capacity of the region, not a coherent effort to control the present epidemic. Ecological or scientific criteria played a minor role in the analysis.

### Apportionment

Six submissions comment on the issue of apportionment or allocation of the increased cut. The common concern expressed is that the allocation must give priority to local jobs, the local economy and community stability. Various strategies are suggested, including:

- establish a local working group to examine alternatives to transporting wood out of the local area (e.g., storing surplus timber).
- use non-renewable, short-term tenures rather than multi-year agreements that have less flexibility.
- encourage new manufacturing and marketing initiatives that have a solid plan to fully utilize dead and damaged timber.
- review operating area allocations at the same time as decisions are made to dispose of increased volumes.

Another individual submission says woodlot licences should be available to everyone living in remote areas, with stumpage kept as low as possible. The benefits, according to this submission, include job creation, keeping money in the region, improved wood quality, and protection of forest structure.

### Harvest Levels

Nine submissions do not express support for an increase in the AAC or advocate a reduction to a sustainable level. The following reasons are offered:

- tourism and recreation opportunities will be diminished.
- the impact on the Entiako caribou herd may be devastating due to increased access for humans and predators.
- the current harvest level is both reasonable and sustainable, and there's no justification to double it.
- an increase will add to the supply of logs at a time of low markets.
- LRMP decisions were based on an AAC of 1.5 million cubic metres, and there was an assumption at the LRMP table that if a beetle epidemic occurred, any remedy would consider all values as being equal. Doubling the AAC would compromise the work of the LRMP table, set a bad precedent and erode public trust.
- creating an even-aged monoculture of pine plantations over the entire harvesting land base is a perfect setup for another, even greater infestation.
- lack of confidence that harvesting the beetle wood will stop the epidemic.
- loss of provincial revenues because of continued low stumpage rates for this wood.
- loss of old-growth wood needed for value-added products.
- lack of a sustainable plan, making operations ineligible for certification and possibly subject to market boycotts.
- other districts with beetle outbreaks will also request large AAC increases, resulting in a region-wide reduction in forest stewardship.
- various technical assumptions are questioned (e.g., reclassifying scenic areas to free up timber; continuous aging of old growth forests outside the harvesting land base; lack of adjustment for epidemic stem rust in plantations).

## Lakes Timber Supply Area

Seven submissions express support for an increased AAC, generally to three million cubic metres, in order to reduce the effect of the beetle epidemic, minimize unsalvageable timber losses and return infested areas to restocked productive states as soon as possible.

Two forest industry submissions say the AAC should be flexible enough to ensure the harvest of all beetle-attacked trees even if the total AAC exceeds three million cubic metres. A progressive approach to increasing harvest levels is proposed by one of these submissions.

**Appendix 1**

# Submissions received by the Lakes Forest District

## Submissions received on the Data Package

**First Nations**

Yekooche First Nation

**Forest industry**

Lakes TSA Major Forest Licensee Interest Group

**Local government**

Burns Lake & District Community Economic Development

**General public**

Five individual submissions

## Submissions received on the Timber Supply Analysis Report

**Forest industry**

Fraser Lake Sawmills
Lakes TSA Major Licensee Interest Group
Babine Forest Products Co.
Vanderhoof Specialty Wood Products (two submissions)
Lakeland Mills, John Casteel
Lakes Community EnviroWood

**Local government**

Village of Burns Lake
Village of Fraser Lake
Regional District of Bulkley-Nechako

**Interest groups**

Northern Ecology Watch, Judy Stratton
David Suzuki Foundation, Ronnie Drever, Research Coordinator
Cortes Ecoforestry Society, David Shipway, Secretary

**General public**

Three individual submissions